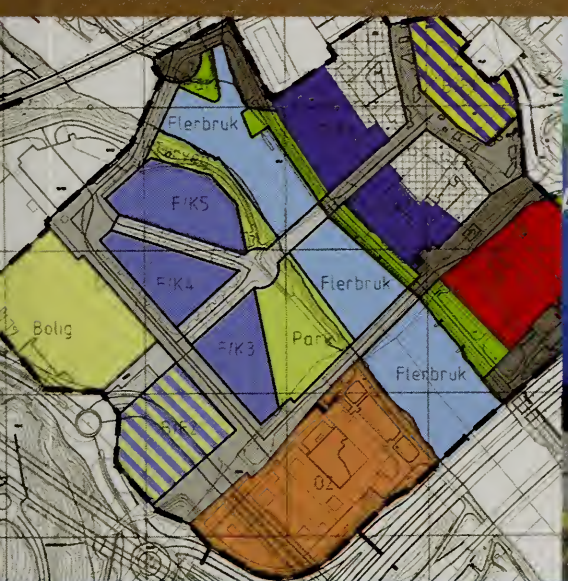
EDITED BY

Jack Nasar &
Jennifer Evans-Cowley

UNIVERSAL DESIGN AND VISITABILITY



From Accessability To Zoning

NATIONAL ENDOWMENT FOR THE ARTS

The John Glenn School of Public Affairs

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Preface

On June 13, 1998, Rosemarie Rossetti went for a bike ride that changed her life. An 80 foot tree fell on her, leaving her paralyzed from the waist down, unable to walk or get around her home. Many people have reduced abilities through birth, accident, or regular activities, such as carrying bags of groceries and trying to unlock a door in the dark.

In our routine movement through our communities, we may overlook the need for barrier-free design, until we experience an injury, or have to negotiate an environment with a stroller, or with someone who uses a wheel-chair or has vision loss. Then, the simple act of entering a building and getting to the desired destination often becomes an unpleasant chore. Yet millions of people experience barriers to movement every day.

The growing aging population in the United States and elsewhere have elevated the awareness of the need for homes and communities that accommodate various abilities. We need houses, neighborhoods, and whole communities designed to work for all abilities and across the lifespan. This means better planning of the arrangement of uses, streets, paths, public spaces, and transportation systems.

Barriers to fully accessible environments result from actions by many entities both public and private. Through regulations, and individual design decisions, humans shape their communities to be more or less accessible. Existing regulations do not accommodate all users, and sometimes, rather than facilitating comfortable movement, create obstacles.

In recognition of the importance of public awareness, the National Endowment for the Arts (NEA) invited proposals for its annual Universal Design Leadership Initiative, calling for: "a project that will create greater public awareness of and demand for universal designed environments, by educating designers, consumers, educators, developers, city planners, and others .

. . [and involved] collaboration with the targeted audiences, using innovative strategies in order to meet the broad social need, while bringing universal design into the mainstream."

Universal design implies a process that goes beyond minimum access codes and standards, to design environments that are comfortably usable by people from childhood into their oldest years. Integrating the core principles of universal design—equitable use, flexibility in use, simple and intuitive, perceptible information, tolerance for error, low physical efforts, and size and shape for approach and use—can improve livability and quality of life for everyone.

The three of us (Jennifer Evans-Cowley, Jack L. Nasar, and Scott Lissner) recognized the importance of this project. We believed we could make a positive impact on the design community in providing outreach and education. We shared a commitment to building knowledge for decisions about the design, planning, and management of our surroundings; and we strongly believed in the value of bringing knowledge about design research (such as that on Universal Design) to planners who propose the policies that shapes urban form.

Among many other things, our grant proposal to the NEA included an international conference on universal design and visitability, and an edited book derived from that conference. In December, 2005, the NEA informed us that our proposal had been selected for the Endowment's 2005 Universal Design Leadership Initiative. We assembled an international list of speakers, and invited seven as keynote speakers. With the first acceptances in hand, we broadened the scope of the conference to include peer reviewed presentations of papers and projects, and we developed a series of awards for the best student papers and projects. We received more than 40 proposals from around the world. Further, Steven Jacobs, President of IDEAL Group, Inc., offered to put the full conference on-line for active distance participation. Two hundred people (125 on-site, and 75 on-line) from as far away as Finland and Japan took part in the conference.

The book introduces the concepts of universal design and visitability. It presents:

- a paradigm for the future
- rationale for studying it
- design examples

- a discussion of design for individuals with vision loss,
- planning barrier free transportation facilities
- successful county-wide and national policy initiatives
- the importance of education, and
- considerations of certain cultural barriers to adoption of policies.

We hope it advances your interest and understanding of this exciting and ever-widening movement. Further, we hope that it provides the information needed to teach the concept of universal design, and to plan, design, and draft policy for making spaces comfortably accessible to everyone. Many groups have an interest in the creation of barrier-free environments: citizens, planners, members of chambers of commerce, students and professionals in the fields of environmental design and planning. We also hope that the information provided here can help such groups think beyond basic access to make our communities more inclusive and thus agreeable for the broader public (all residents and visitors).

Acknowledgments

The conference and this book would not have materialized without the support of the National Endowment for the Arts Universal Design Leadership Initiative, and the partnership that supported and planned the Universal Design and Visitability Conference: The Ohio State University, the Glenn School of Public Affairs, the Kirwin Institute for the Study of Race and Ethnicity, the Knowlton School of Architecture, and the Americans with Disabilities Act (ADA) Coordinator's Office. We thank all of them.

We are grateful to Scott Lissner for his assistance in organizing and publicizing the Universal Design and Visitability Conference (July 13-14, 2006 in Columbus, Ohio), to Wolf Preiser (co-editor of The Universal Design Handbook) and Dick Duncan (Senior Project Manager, The Center for Universal Design at North Carolina State University), for their advise on keynote speakers, and to the contributing authors to this book.

Many students helped in convening the conference: Corrin Hoegen, Andrea Cooper, Art Curley, Brandy Dunlap, Meghan Gough, Matt Lantow, Heide Martin, Goldie Ludovici, Laura Slocum, Anne Warjone, Brent Warren, and Shan Wu—helped

us run the conference; and we thank them all.

We thank Corrin Hoegen for designing the cover and laying out the book.

Lastly, we thank the more than 200 faculty, students and professionals and others who took part in the conference. We created this book for you and others who support the goals of making our world more accessible for everyone.

Jack L. Nasar
Jennifer Evans-Cowley
The Ohio State University
January 31, 2006

Foreword

There was a time not so very long ago when the concepts presented in this book would have seemed futuristic or, at best, quaint but impractical. Our understanding of universal design and its younger sibling, visitability, have come a long way in a fairly short time, though, and there's hope that we will start more rapidly learning to recognize some significant patterns.

The single most important of these "patterns" is the demonstrated truth that if a thing is good for what seems to be a small subset of the population, it will usually be better for and embraced by all.

Here's one simple example. You go on a short business trip. For the 100-mile drive, you pop a recording of a new suspense novel or management tome into the car's CD player. At the hotel, you instinctively wheel your luggage up and down the curb cutouts and ramps. In your hotel room, an important phone call comes while you're watching an interesting documentary, so you press the mute and closed-caption buttons on the remote and have a quiet conversation while monitoring your program in the background.

Each of these conveniences—the audio book, the ramp, curb cutout, the closed-caption text appearing on the TV screen—was initially invented to assist people with disabilities. And every one of them has become a commonplace amenity enjoyed daily by the general population.

With predictions that we will see 40 million Americans over the age of 65 by the year 2010 and 70 million by 2030, the need to ensure that public facilities and private homes alike are designed and built to be usable throughout the lifespan is more pressing than ever. We need communities in which crossing a street is not a death-defying adventure and where transportation is readily accessible to everyone. We need multi-family and single-family homes where anyone—whether on foot or

with a walker, scooter, or wheelchair—may enter, navigate, and live independently.

As we catch on to the news, as a society, that universal design and visitability are concepts that must be implemented coast to coast, in communities rural and urban, large and small, the next step is figuring out how to accomplish this task.

That's where this book comes in. Jack L. Nasar, Jennifer Evans-Cowley, and Scott Lissner hosted an international conference on universal design in July 2006 at The Ohio State University. Recognizing that the concepts presented at the conference warranted wider distribution, they have culled the proceedings, revised and edited the best, and gathered them into this single publication.

You will find guiding principles, valuable statistics, and examples of the concepts of universal design and visitability at work in this book. Whether you happen to be a seasoned planner, designer, or policy maker or a student or advocate wanting to learn more, you will find new and useful information in these pages. Best of all, you may well absorb, as I did, the pervasive wisdom held by a growing number of leaders in this field that, far beyond the dry notions of legalities and requirements, universal design and visitability, when implemented properly, are principles that just plain make good sense, financially and morally, for all of us.

Deborah Kendrick
Cincinnati, OH
December 4, 2006

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Integrating the Seven Principles of Universal Design into Planning Practice

Wolfgang F. E. Preiser

Abstract

Universal design is about the power of lifting the human spirit beyond the minimum requirements legislated by the Americans with Disabilities Act. To ascertain the viability of the Seven Principles of Universal Design (Preiser and Ostroff, 2001), this chapter develops objective and explicit performance criteria that can be aligned with the traditional three levels of priorities: 1. Health, safety, security; 2. Function, efficiency, work processes; and 3. Social, psychological, cultural performance (Preiser, 2003). These can be related to control mechanisms common in planning, such as building codes, zoning regulations, design review, tax incentives, and guidance, which have emanated from environment/behavior research over the past 35 years. Due to the paucity of systematic universal design evaluation research (Preiser, 2001), the author discusses case study examples at the planning and urban scale. The underlying theoretical framework is based on feedback and aiming at continuous quality improvements, in the expectation that universally designed environments will facilitate their use by a vast majority of people. The chapter makes recommendations for future explorations into the application of universal design at the urban scale, and to the field of planning in general.

Introduction

Universal design has the power to lift the human spirit, especially when environments are designed to truly meet the needs of people who use them. Universal design ranges from inclusive and non-discriminatory design of products, cars, architecture, and urban environments and infrastructure, all the way to information technology/telecommunications.

At the scale of very large facilities, such as airports and university campuses, significant changes occurred after the implementation of the Americans with Disabilities Act in 1991. The results were usually adaptations and quick fixes to

make existing facilities accessible to (almost) all. The image that conjures up the antithesis of universal design is the former TWA Terminal at JFK Airport in New York, designed by the famous architect Eero Saarinen. Eventually, they had to cover the elegant stairs with ramps because everyone using the airport had to be accommodated. Not just people who use wheelchairs, but all sorts of other people with wheeled conveyances used the ramps: airline pilots with wheeled suitcases, families with strollers, and workers pushing hand trucks on the way to servicing vending machines. Post-facto modifications like these ramps compromise the idea of universal design because one should incorporate an inclusive way of thinking and integrative design concepts into projects from the very beginning. The Master Plan for JFK provides for adaptive re-use: the TWA terminal is to be transformed into a conference center.

At the planning and urban scale, the present fight against sprawl (Bruegmann, 2005) and "the war against suburbia" (Kotkin, 2006) seem to ignore the preferences of most Americans. Kotkin observes: "Across a broad spectrum of planning schools and practitioners, suburbs and single family neighborhoods are linked to everything from obesity, rampant consumerism, environmental degradation, the current energy crisis—and even the predominance of conservative political tendencies." Departing from the traditional subdivision patterns that lack sidewalks and amenities and services that can be reached without getting into the car, new concepts are emerging that integrate mixed-use commercial development with residential housing. These so-called life-style communities have distinct universal design attributes: they permit everybody, including older adults and persons with disabilities, to frequent the neighborhood center on their own without having to overcome great distances requiring transportation. There are historic precedents for this movement, albeit more all-encompassing new town concepts dating back to the 1960s like the pedestrian- and bicycle-oriented town of Tapiola just outside Helsinki, Finland.

At the national scale of planning, Norway appears to have progressed the most in the world when it comes to the implementation of the concept of universal design throughout the entire country, all the way down to the community level (Bringa, 2001). This includes planning and design school cur-

ricula, which must embrace universal design. It indicates that Norway is taking the long-term perspective as far as the well being of its citizens is concerned. There is also great concern for the environment, green building, energy conservation (they have one of the world's highest gasoline prices, despite being a major oil producing country), and saving for the future in general.

At the global level, a revolution in information technology, and telecommunications infrastructure in particular, has been occurring in the recent past. This is due to the most ubiquitous and perhaps most universally designed gadget, the mobile phone. Mobile phones have the promise of bridging the real digital divide between rich and poor countries (The Economist, 2005): "Mobile phones are, in short, a classic example of technology that helps people help themselves." To that effect, a company plans to mass produce a $100 cell phone for markets in the developing world and, it is hoped, for the economically disadvantaged in the U.S. as well.

Overcoming the real digital divide is one of the great benefits of cell phones already mentioned above. Think of the enormous cost of infrastructure investments if one had to build land phone lines in a continent such as Africa, or any poor country, for that matter. Instead, people in these countries are using cell phones, a realistic way for poor people to make progress, to connect with the world, and to generate income. Creating a policy of pooling limited resources will allow informal groups to form and share access to the resources the cell phone can reach.

"the new paradigm... advocates self-regulating systems, as well as feedback based continuous quality improvement"

Similarly, in the United States cell phones are enabling socio-economically weaker segments of the population to communicate, access services, and relocate jobs and housing (much more frequently than the average citizen) at a cost that has become much lower than the traditional land line hookups, especially with the multiple-phone family plans that are increasingly available.

On the negative side, mobile phones increase the risk of car accidents fourfold due to distractions, regardless of whether the devices are hand held or hands free. Consequently, a number of states and municipalities have outlawed mobile phone use while driving a vehicle. The problem of distractions caused by cell phones also applies to pedestrians (Nasar, et al., 2004).

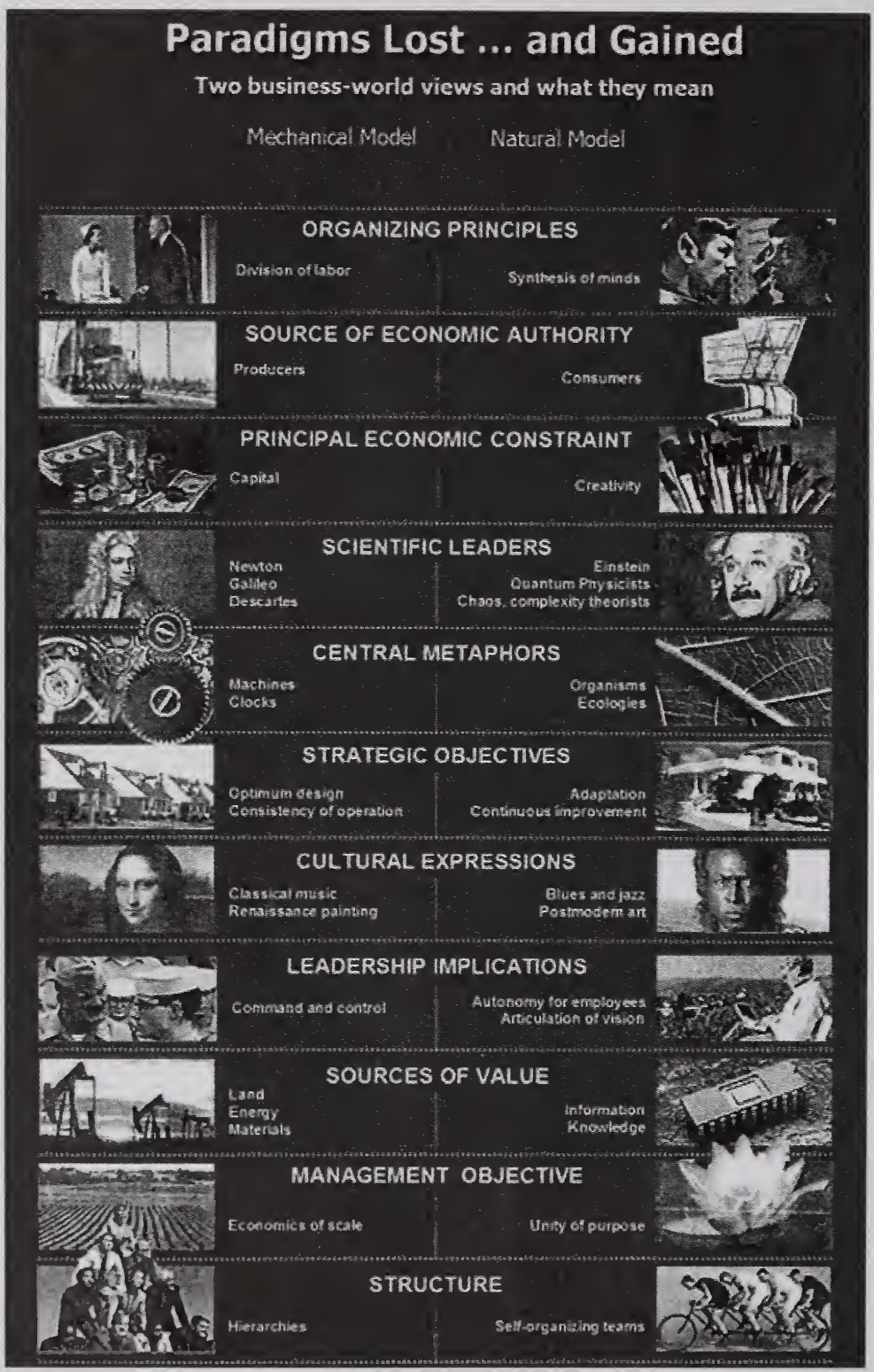

Table 1.1 Paradigm shift from mechanical to natural model

Paradigm Shift: From Fixed to Living Systems

A significant paradigm shift has taken place in the world of business in recent decades (Petzinger, 1999). For hundreds of years the Newtonian paradigm, with its mechanical, hierarchical, and natural resource/capital driven system, prevailed. Supply side domination of the market place used to dictate and limit consumer choices: you can buy your Model-T Ford

in any color, as long as it is black. Similarly, in the post-World War II era monotonous housing in suburbs like Levittown, New York assumed that one size fits all.

Einstein's Theory of Relativity led not only to the development of cybernetics (von Foerster and Poerksen, 1998)—the science of feedback, feed forward, and control—it ultimately evolved into the new paradigm for business: It is alive and it advocates self-regulating systems, as well as feedback-based continuous quality improvement. A military application resulted in the development of cruise missiles, which can read the terrain and use the feedback to adjust their course toward a target. Similarly, the new paradigm promotes consumer-driven, customized mass production of products, cars, and other commodities like housing. Information is the currency of the day, not extracted minerals or agricultural, industrial, and consumer products. In Silicon Valley and the film industry, and for high tech enterprises like Microsoft, creativity is the driving force. The "chaordic" systems approach, as described by Hock (2005), signifies order in a chaotic world based on non-hierarchical and adaptable principles and governance. The global expansion of the ubiquitous VISA card, the most successful business venture in history, exemplified this. It may well be an appropriate model for planning complex environments that are responsive to an increasingly diverse social, economic, and cultural world.

Gilroy (2006) observed in his obituary of Jane Jacobs: "Modern planners have contorted Jacob's belief in hopes of imposing their static, end-state vision of a city." He describes this approach as counter to Jacobs' belief that cities, "thrive on private initiative, trial-and error, incremental change, and human and economic diversity," and her view that the best communities, "are diverse, messy and arise out of spontaneous order, not from a scheme [dictating] how people should live and how neighborhoods should look."

Universal Design at the Planning and Urban Scale

Multiple examples of applying universal design principles at the urban scale can be found in the Universal Design Handbook (Preiser and Ostroff, 2001). For instance, it has a chapter by Weisman on creating a universally designed city; chapters by Manley and Vescovo on universal design in the urban

realm; chapters by Goltsman, Miyake, and Robb on urban landscaping, parks, and national parks; a chapter by Beasley and Davies on sports and entertainment venues; a chapter by Fletcher on waterfront development; chapters by Grosbois and Steinfeld on transportation; and a chapter by Tappuni on the reconstruction of the Beirut CBD.

In the following, this chapter attempts to address universal design by illustrating the "Seven Principles of Universal Design" developed by the Center for Universal Design at North Carolina State University (Story, 2001). The chapter explains the principles; highlights their system performance criteria, and describes their applications at the urban and building scale through select case study examples; outlines implications for control mechanisms; and presents ideas for further exploration of relevant issues in the future.

"provide the same means of use for all users, identical whenever possible, equivalent when not"

Compared with traditional performance criteria (Preiser, 2003) for planned and designed environments, some of which are codified in life safety and building codes, the principles are lofty ideals and guiding principles that need to become better operationalized so that planners and designers can use them in their projects. The following three-level hierarchy of priorities corresponds to degrees of codification as they exist today:

1. Health/Safety/Security Performance: Addressed by "must adhere to" codes and regulations.
2. Function/Efficiency/Process Performance: Covered by guidelines that may be internal to a community or organization.
3. Social/Psychological/Cultural Performance: Derived from years of research studies on the effect of the planned/built environment on human well being.

Principle 1: Equitable Use

"The design is useful and marketable to people with diverse abilities" (Story 2001).

Provide equal access. This idea speaks to our democratic principle of equality. Everybody should have equal access to built and urban environments. "Provide the same means of use for all users, identical whenever possible, equivalent when not" (Story 2001) promotes equal access to streets and sidewalks, public (and privately owned) buildings, community centers, hospitals, schools and colleges, transportation facilities, urban

and national parks, and so on.

System Performance Criteria

Provide horizontal pathway systems which separate travel paths and surfaces from vehicular traffic, thus easing pedestrian and wheelchair movement, either at ground level, above, or underground.

For example, street level crossings of vehicular roadways and pedestrian sidewalks present a complex situation, especially for travelers who are blind or have low vision. Drivers do not obey traffic lights in some cultures. For example, in Brazil the author found drivers racing through red lights at night, while drivers with green lights cautiously approached the intersections and then checked cross traffic before proceeding.

The National Federation of the Blind and the American Council of the Blind had considerable debate as to whether sound signals at pedestrian street crossings (e.g., buzzers, chirping bird sounds) are effective. The National Federation rejects them and maintains that sound traffic signals are bad, since they are present in few places. Instead, it would prefer that people who are blind or have low vision to use white canes and seeing-eye dogs. In Japan, communities have installed both rubberized tiles in the pavement, and sound signals at street crossings.

Different issues arise with skywalk systems. Minneapolis, where the severe climate forces people inside for much of the winter, has an extensive skywalk system that attracts heavy use. However, in Cincinnati and other U.S. cities with milder climates, skywalk systems have been all but abandoned and/or disrupted in various places, making them dysfunctional. Skywalk systems can suck pedestrian life out of sidewalks at street level, while at the same time presenting passersby with empty store fronts at the skywalk level. Similarly, the underground passage and mall system works well for Montreal, but in balmy Albuquerque, New Mexico the underground shopping center next to Fountain Square sits mostly empty.

In general, private shopping centers are by definition discriminatory: the owners often use security to remove "undesirables" such as teenagers or other persons just hanging out. This has included our students who were doing observational studies or were trying to conduct surveys of shoppers.

An anecdote about an accessibility paradox: With tourism being a major driver of the economy in Edinburgh, Scotland, the cathedral dedicated to the Patron Saint of the Disabled, St. Giles, is a curious example of inaccessibility. Located on the Golden Mile, and converted into a tourist information center, the cathedral belies its name because its main entrance is not accessible to people with disabilities.

When dealing with an historic structure like St. Giles Cathedral, one cannot cover the steps with a ramp, as was done in the TWA Terminal building referred to above. One will have to figure out equal access, perhaps with clear signage pointing to a side entrance where there is an elevator that can reach all critical levels of the building.

Principle 2: Flexibility in Use

"The design accommodates a wide range of individual preferences and abilities."

Provide choices and adaptability. This concept provides for adaptive re-use of existing facilities, such as converting lofts into housing or turning hardware stores into churches. At the community scale, it also aims at the creation of a variety of mixed, complementary uses, such as retail and recreation and entertainment in connection with housing (i.e., so-called life-style centers) or even more advanced and increasingly popular mixed-use suburban town centers. Langdon (2006) characterized these as follows:

> "the ingredient missing from many suburbs is a 'town center', a place people head to for many different purposes—to shop, dine, visit a library, deliver a package to the post office, take in a movie or a concert, or just to enjoy being in an animated public place."

System Performance Criteria

Better meet increasing demand among people wishing to reside in downtowns and/or in walking/biking distance from their employment locations. Similarly, recognize the growing trend to develop so-called life-style communities, with high density housing in walking distance from shopping and services, as well as entertainment and recreation. According to the New Urbanists, an acceptable walking distance range is from 600 feet to about ¼ mile.

Over the years, there have been many attempts at traffic calming in Europe and elsewhere, especially in older cities. Design solutions include roundabouts at street intersections, single lane automobile traffic with on-street parking, planters, and places to sit. The Village at The Streets of West Chester (Ohio) is a new town center being built. One of its designers, Jeff Raser (2006), characterizes this project as pedestrian-friendly for all pedestrians, whether a person without disabilities, a person who uses a wheelchair, a person who uses crutches, a person with a stroller, older adults or young adults.

According to him, wheelchair ramps and handrails are not enough. A universally designed neighborhood should have narrow streets, easy to cross, bump-outs for "safe harbor for pedestrians to stand on when awaiting their chance to cross, sidewalk ramps to crosswalks that are "well defined with a rectangle of contrastingly colored truncated domes along the back rail of the curb," and "crosswalks well-marked with texture in the street, like stamped concrete or asphalt."

"planning for choice and adaptation"

An example of a "beyond the beltway community" is Burnsville, Minnesota, with its Excelsior & Grand town center. Ben Garvin of the New York Times (2006) noted:

> "The latest thing in suburban development is something very old: city living . . . A handful of suburban areas around Minneapolis-St. Paul have begun ambitious plans to create town centers, with pedestrian friendly sidewalks, condos, restaurants and shops. If it looks like a city, well, it is supposed to."

Another example of planning for choice and adaptation are sports arenas and stadiums. In recent years there have been federal lawsuits against some major sports arena and stadium design firms, who basically designed according to code. However, they didn't understand that sight lines can be disrupted when spectators get excited and stand up, blocking the view of a person who uses a wheelchair. The spirit of universal design is exemplified by arrangements providing for flexible seating and choices in different locations and price categories.

A good example of flexible arena design for spectators with disabilities may be the Nationwide Arena in downtown Columbus, Ohio in which hockey is played. It provides for choices in seating. It has fixed seating and mobile seating, next to which a wheelchair can be pulled up, in various price ranges and seat-

ing locations. Meanwhile, in the Schottenstein Arena at The Ohio State University, and despite the good intentions of the arena planners, sight lines are still disrupted because spectators climb on top of their seats when the action gets wild.

Principle 3: Simple and Intuitive Use

"Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level."

Make urban environments legible and attractive through their spatial qualities.

"provide accurate and intuitively understandable directional guidance or markers"

System Performance Criteria

Provide accurate and intuitively understandable directional guidance or markers for planned and designed environments, which in themselves need to be legible with a minimum of confusion at both pedestrian and automobile speeds. Furthermore, devise criteria that apply to persons with different sensory disabilities.

The qualities inherent in good urban design were defined by Kevin Lynch (1960) as focal points for orientation, edges or barriers, places of congregation, and so on. These were visual means to describe and define markers, boundaries, and other spatial features of the urban environment, primarily seen from the perspective of pedestrians. At the speed of automobiles, different mechanisms are at work, such as highly visible destinations like the Transamerica Tower and Golden Gate Bridge in San Francisco; the Opera House or Harbor Bridge in Sydney, Australia; the Wasatch Mountains in Salt Lake City; or the hugely successful harbor front in Baltimore.

Making public parks, playgrounds, and spaces accessible is just as important as the free use of public facilities such as toilets that serve everybody, including people with disabilities and tourists. In Paris, 400 new and latest model automatic conveniences will be installed, with an exterior tap for drinking water.

Principle 4: Perceptible Information

"The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities."

Offer redundancy of sensory modes in signage and way-finding systems.

System Performance Criteria

Provide for some degree of redundancy among the different senses, especially when one is dealing with emergency egress: signage and signals using sound, light, or even strobe lights. Employ different media, like pictograms, touch, or other means of presenting stimuli or information. Enhance the legibility of essential information using hierarchies of letter sizes, different fonts, colors, and graphic systems.

Japan uses tactile and visual clues on sidewalks and subway station platforms. Yellow, rubbery tiles with raised straight lines mean "proceed." Dots indicate "stop and re-orient"

Distance markers and maps help create mental maps for drivers, setting up anticipation of what to expect in making driving decisions, such as turning off of a freeway. Amber alert signs are a form of universal design, since they alert all drivers to traffic conditions that lie ahead or vehicle information on missing persons' kidnappers.

"clarity in signage systems and communication of information essential to the traveler's direction finding is of utmost importance"

In transportation facilities such as airports, travelers must have clear signage systems and communication of information to find their way around. When the Dallas-Fort Worth Airport first opened, it was thought that automated trains and video displays of gate information could replace ground personnel. In reality, once passengers boarded a train, they received no more feedback on the train's location in relationship to their destination. The loop routes of the trains meant that with no reference to the outside many passengers felt disoriented and distressed, traveled in circles, and ultimately had to ask for assistance. Recently traveling through that airport, the author saw personnel at every corner asking, "Do you have a question?" In other words, overkill in technology can result in poor performance and experiences. Similarly, at the Atlanta airport MARTA (the Metropolitan Atlanta Rapid Transit Authority) changed the toll system to tickets which are dispensed from a machine. This was so confusing that MARTA had to post a person at each machine to explain how to use it. This is self-defeating: can you imagine a person standing at every machine once it goes system-wide?

Large hospitals, frequently accretions of building phas-

es and additions over time, are notorious for confusion and stressful wayfinding experiences. One such case is Children's Hospital in Cincinnati, which covers a huge area with no clear indication of where to enter, park, and proceed from there. Accordingly, the hospital developed a color coded building directory and synchronized signage system.

"secure and safe for all"

Principle 5: Tolerance for Error

"The design minimizes hazards and the adverse consequences of accidental or unintended actions."

"Make environments secure and safe to use by all" (Story 2001).

System Performance Criteria

Kendrick (2003), who is blind, noted that accessible sidewalks are her most important criterion when selecting a place to live. They allow her to access any service, program, or product everybody else uses. Of course, many suburban communities have abandoned the idea (and cost) of building and maintaining sidewalks. Where they do exist in urban areas they need to be free of obstructions, cracked concrete, and other obstacles which might cause a person who has low vision to fall and get injured. As Kendrick put it, sidewalks are

> "ribbons of concrete that, when smooth and unobstructed by tree roots and utility lines, bring all citizens, with and without disabilities, into the same employment, education and recreational activities our communities offer".

Special elevators for emergency evacuations from high-rise buildings are an example of progress being made. An article in The Wall Street Journal (Frangos, 2005) discussed elevator safety for all building users, including rescue personnel. The article reflects on the commission that is investigating 9/11, and the fall of the twin World Trade Center towers. Why is it that other countries' building codes in Europe and most of Asia require these lifts, although the rules differ? In the U.S. we not only forbid people to go down in elevators, but firefighters cannot use elevators to go up and help people to evacuate. In 1993 they had to walk up the World Trade Center stairs, which was utterly ineffective. In countries like Malaysia, with the Petronas Tower in Kuala Lumpur designed by Cesar

Pelli, such elevators are common. The new Freedom Tower in New York City, designed by SOM, will have such an elevator. June Kailes, a Los Angeles based disability consultant said:

> "Disability rights activists are strong supporters of the elevators. What we learned from 9/11, and many events before 9/11, is the ability to evacuate multi-story buildings, an issue for a broad spectrum of people who would never identify themselves as disabled, but who couldn't negotiate so many steps."

This is true because there are many people who are not necessarily using wheelchairs but have all kinds of mobility problems, and who would find themselves stranded on the 100th floor, where they would probably all perish. We have a lot to improve in the area of fire egress from tall buildings.

Remembering the disastrous evacuation of New Orleans in the aftermath of Hurricane Katrina, one could argue for universally designed disaster evacuation plans for cities and regions that are vulnerable and experience disasters on a recurring basis.

"reduce expenditure of effort"

Principle 6: Low Physical Effort

"The design can be used efficiently and comfortably, and with a minimum of fatigue."

This principle has to do with inclines and the surface characteristics (e.g., carpeting versus hard floor or gravel).

System Performance Criteria

"Find ways to reduce the expenditure of effort and to minimize repetitive actions at all scales of the environment" (Story, 2001).

An example of affordable and accessible mass transportation is a rapid transit system, which was developed using dedicated high speed lanes in Ecuador and Brazil. Bus stations have ramps on either side. After entering and paying, one is level with the floor of the buses—allowing for rapid loading and unloading. There is no delay for paying or using a wheelchair. This is a universally designed rapid transport system that is appropriate for those countries that cannot afford subways.

When it comes to individualized public transportation (i.e., taxis), London is considered the most accessible city in the world. All new taxis must have foldout ramps, which take

a few seconds to put in place. All older model taxis must have one of these ramps in the trunk. In addition, the taxis are comfortable, with high ceilings and multiple seat configurations. For example, one can put a seatbelt around one's wheelchair in order to secure it. However, the subways (called "the tube") are not accessible at all, except for the new Jubilee Line.

At the building scale Zipf's (1949) famous "Human Behavior and the Principle of Least Effort" clearly applies. Festinger's (1950) classic socio-metric study, exploring post-W.W. II GI Bill MIT student housing, demonstrated that the amount of effort that was implied in overcoming distance and number of floors was critical in the establishment of acquaintance and friendship patterns among residents. Another multi-stairway investigation (Hanyu and Itsukushima, 2000) found that increased expenditure of effort resulted in reduced use.

"access for all"

Finally, as was noted for evacuation above, residential elevators are essential for a variety of groups with disabilities, whether wheelchair-users or not. A new generation of more affordable elevators, using the suction principle that can accommodate wheelchairs, is coming on the market (Daytona, 2006).

Principle 7: Size and Shape for Approach and Use

This principle and category clearly does not apply to the urban and planning scale when interpreted in its original meaning: the limits the human body and dimensions place on the accessibility of counters, shelving, appliances, dispensers, controls, electrical outlets, door handles, and other critical items. Therefore, in considering the goal of "Access for All" at the urban scale, different concepts come into play.

System Performance Implications

The elements that are critical for a city to be livable refer to "accessibility" from the perspective of pedestrian distances in neighborhoods in high density cities like New York. In Manhattan most necessary daily services—shopping, the library, churches, and entertainment—are within a mile's walking distance from one's apartment. Lewis Mumford testified to this in his 1979 film classic, "Toward a Humane Architecture" (Meehan, 1991). In short, in this type of community the operating principle is integration, not separation of uses, and,

implicitly, zoning approaches. Building "Livable Communities" in the interest of maintaining independence for seniors is also strongly advocated by the American Association of Retired Persons (AARP). The common elements of this include: "affordable and appropriate housing, public transportation, community services, nearby shopping and medical services, job opportunities, and recreation" (Novell, 2006).

An example of this are current inner-urban redevelopment schemes in the U.S. in which mixed-use zoning calls for high-rise buildings with residential floors at the top, a hotel underneath, office uses below that, retail at the street level, and, finally, parking underground.

Many precedents exist in Japan at both Tokyo and Nagoya Stations. Mixed-use towers have been built with office zones, hotel zones, and restaurant zones, as well as retail shopping centers.

1. The Marunouchi Building in Tokyo connects to the Japan Rail Station and the city blocks being redeveloped around it via a system of underground shopping arcades and tunnels, which are fed by the traffic that is generated by hundreds of thousands of passengers passing through the station every day. Two remarkable features distinguish this building, which was fully leased only months after its opening in 2003, while there was a glut of office space in Tokyo. First, it has a huge atrium space, open to the public, which is used for exhibits and public gatherings. It is, in fact, a window to the community, welcoming the public for lunchtime concerts and other events. Second, at the top level of the tower a viewing floor is open to the public at no charge. In short, the building has become a destination in Tokyo—a public place in private property.

2. The JR (Japan Rail) Tower in Nagoya uses air rights above Nagoya Station and contains a mix of uses that is similar to the Marunouchi Building, plus a Marriott Hotel. Most unusual compared to the U.S., it has a buzzing Sky Mall 13-15 floors above street level.

At a smaller scale, and in the suburban context of the U.S., many of the continuously growing communities outside the beltway are playing catch-up with the increasing need for community infrastructure and support facilities, like community centers. For example, the Lakota Schools in West Chester, Ohio planned high schools with the "Main Street " concept

in mind—a large, long space primarily used as student break areas, but also for community events such as public fairs and gatherings.

Field Evaluations at the University of Cincinnati

While the Seven Principles of Universal Design have been devised as ideals and general guidelines, almost like the Ten Commandments, they lack specificity and operational utility. For that, we need continuing field-based evaluations of all kinds of facilities. Field learning and universal design evaluation exercises are an important component (Preiser, 2001). In the "Universal Design" course in the School of Architecture and Interior Design at the University of Cincinnati, we have carried out evaluations of the university campus, the International Airport, the public library system of 42 branches, supermarkets, banks, hospitals, the Contemporary Art Center, and other facilities. Many of these facilities, despite meeting the ADA guidelines and regulations, are not accessible.

Consider a new campus building, intended as a one-stop center where students register, pay, get assistance, and so on. We found that if one pushes the button to open the door, by the time one gets to the door it is already closing. Had someone field test it first, they would have seen that it needs a post-mounted button that one can push and get through the door right away. When planning new buildings, one needs to use integrative thinking from the start, literally making the built environment a level playing field.

Ideas for Future Exploration

Future research will need to clarify advantages, disadvantages and cost implications of the following:

1. Level versus underground and above-ground street crossings. This includes above-ground skywalk bridges versus underground concourse and connector tunnel systems, such as the one in Montreal, Canada referred to above, or underground arcades which fill the inside of city blocks with shopping, restaurants, and other people-intensive uses.

2. Adaptable buildings and facilities, as well as mixed-use zoning, which combine commercial land use with community services, shopping, and residential housing. This includes downtown revitalization, such as the conversion of department

stores, office buildings, and lofts to residential use; upgrading centers of older suburbs like Hyde Park and Clifton in Cincinnati; and the proliferating new town centers in today's suburbs in more than 60 locations in the country.

3. Signage control ordinances that regulate permissible locations, sizes, and other parameters of signs in public spaces.

4. Special ordinances permitting tactile signage systems in sidewalks and platforms of stations. Developing globally usable signage for sports venues like the Olympics using pictograms, for example.

5. The application of universal design principles to people movement in general, as well as the mitigation and aftermath of disasters in particular.

6. Establishing realistic distances that pedestrians, the older adults, children, and wheelchair users can master under various conditions (e.g., weather, temperature, traffic density). This should also be extended to such venues as amusement parks, where covering great distances, waiting for rides, entering rides, dealing with crowds, as well as accessibility of toilet rooms and eating establishments are important. Making potential experiences the same or similar for all is most desirable, like dipping one's feet into fountains.

Epilogue

This chapter sought to demonstrate that universal design holds the potential for humanizing environments, both at the general planning and urban scales, and especially, if the political will exists to focus various aspects of urban planning on inclusive planning for all. To quote Kotkin (2006) again:

> "It is time politicians recognized how their constituents actually want to live. If not, they will only hurt their communities, and force aspiring middle-class families to migrate ever further out to the periphery for the privacy, personal space and ownership that constitutes the basis of their common dreams."

Universal Design Handbook: A Resource

Many questions about universal design can be answered by Preiser and Ostroff's (2001) Universal Design Handbook. It has chapters on conceptual frameworks and policies for universal design at the building, community, and global scales,

as well as case studies from around the world. The back cover has a CD with the Americans with Disabilities Act Guidelines (ADAG), and other helpful materials. One can download these and use them to determine what provisions are relevant to specific design projects. However, remember that universal design is intended to transcend the ADA, which usually addresses only minimum requirements and dimensions.

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References

Beasley, K. A. , & Davies, T.D. (2001). Access to sports and entertainment. In W. F. E. Preiser, & E. Ostroff (Eds.), *Universal Design Handbook*. New York: McGraw-Hill.

Bringa, O.R. (2001). Norway's planning approach to implement universal design. W. F. E. Preiser, & E. Ostroff (Eds.), *Universal Design Handbook*. New York: McGraw-Hill.

Bruegmann, R. (2005). *Sprawl – A Compact History.* Chicago: University of Chicago Press.

Festinger, L. (1950). *Social Pressures in Informal Groups.* New York, Harper.

Fletcher, V. (2001). A neighborhood fit for people: Universal design on the South Boston waterfront. In W. F. E. Preiser, & E. Ostroff (Eds.), *Universal Design Handbook*. New York: McGraw-Hill.

Frangos, A. (2005). Panel may recommend firefighter elevators. The *Wall Street Journal,* April 20.

Garvin, B. (2006). Suburbs want downtowns of their own. *The New York Times*, April 30.

Gilroy, L. (2006). Urban planners are blind to what Jane

Jacobs really saw. *The Wall Street Journal*, May 2.

Goltsman, S. (2001). Universal design in outdoor areas. In W. F. E. Preiser, & E. Ostroff (Eds.), *Universal Design Handbook*. New York: McGraw-Hill.

Hanyu, K., & Itsukushima, Y. (2000). Cognitive distance of stairways: A multi-stairway investigation. *Scandinavian Journal of Psychology , 41*, 63-69.

Hock, D. (2005). One from many: VISA and the rise of chaordic organization. San Francisco: Berrett-Koehler Publishers.

Kendrick, D. (2003). Making sidewalks accessible is the decent thing to do. *The Cincinnati Enquirer*, Sunday, June 8.

Kotkin, J. (2005). *The City: A Global History.* New York: Modern Library.

Langdon, P. (2006). Creating the missing hub. *Planning Commissioners Journal, 62,* Spring.

Lynch, K. (1960). *The Image of the City*. Boston: MIT Press.

Manley, S. (2001). Creating an accessible public realm. In W. F. E. Preiser, & E. Ostroff (Eds.), *Universal Design Handbook.* New York: McGraw-Hill.

Miyake, Y. (2001). Landscape design. In W. F. E. Preiser, & E. Ostroff (Eds.), *Universal Design Handbook.* New York: McGraw-Hill.

Mumford, L. (1991). Toward a Humane Architecture. In P. J. Meehan, (Ed.), *Frank Lloyd Wright Remembered.* Washington: The Preservation Press.

Nasar, J.L., Hecht, P., & Wener, R. (2004). Cell phone use and situation awareness. Proceedings of the EDRA 35 Conference. Edmond, OK: Environmental Design Research Association, Inc.

Novell, W. D. (2006). Building livable communities. *AARP Bulletin, June 2006, 37.*

Petzinger, T. (1999). A new model for the nature of business: it's alive! *The Wall Street Journal,* February 26.

Preiser, W. F. E. , & Vischer, J. C. (Eds.). (2005). *Assessing Building Performance.* Oxford, UK: Elsevier.

Preiser, W. F. E. (2004). Evaluation and building performance. In A. Dilani (Ed.), *Design and Health III:*

Health Promotion through Environmental Design. Stockholm: International Academy for Design and Health.

Preiser, W. F. E. (2001). Toward universal design evaluation. In W. F. E. Preiser, & E. Ostroff (Eds.), *Universal Design Handbook.* New York: McGraw-Hill.

Preiser, W. F. E., & Ostroff, E. (Eds.). (2001). *Universal Design Handbook.* New York: McGraw-Hill.

Raser, J. (2006). The Village at The Streets of West Chester. Personal Communication of May 2. jraser@glaserworks.com

Robb, G.M. (2001). Universal design in outdoor areas. In Preiser, W. F. E. and Ostroff, E. (Eds.), *Universal Design Handbook.* New York: McGraw-Hill.

Steinfeld, E. (2001). Universal design in mass transportation. In W. F. E. Preiser, & E. Ostroff (Eds.), *Universal Design Handbook.* New York: McGraw-Hill.

Story, M. F. (2001). Principles of universal design. In W. F. E. Preiser, & Ostroff, E. (Eds.), *Universal Design Handbook.* New York: McGraw-Hill.

Tappuni, R. (2001). Access in rebuilding Beirut's center. In Preiser, W. F. E., & E. Ostroff (Eds.), *Universal Design Handbook.* New York: McGraw-Hill.

The Economist (2005). Calling an End to Poverty. 376, 8434, 51-52.

Vescovo, F. (2001). Accessibility as universal design: legislation and experiences in Italy. In W. F. E. Preiser, & E. Ostroff (Eds.), *Universal Design Handbook.* New York: McGraw-Hill.

Von Foerster, H. and Poerksen, B. (1998). *Truth is the Invention of a Liar: Conversations for Skeptics.* Heidelberg: Carl Auer-Systeme Verlag.

Weisman, L.K. (2001). Creating the universally designed city: Prospects for the new century. In W. F. E. Preiser & E. Ostroff (Eds.), *Universal Design Handbook.* New York: McGraw-Hill.

Zipf, G. K. (1949). *Human Behavior and the Principle of Least Effort.* Cambridge, Addison Wesley.

Toward Inclusive Housing and Neighborhood Design: A Look at Visitability

2

Jordana L. Maisel

Abstract

As a population ages and faces a greater number of physical disabilities, housing and community design must be re-examined. This research explores the growing need for accessible housing in the United States and the recent emergence of visitability as an affordable and sustainable design strategy aimed at increasing the number of accessible single family homes and neighborhoods. The research uses both qualitative and quantitative methods to study the evolution of accessible housing policy in the United States, the history and fundamental principles of visitability, and the number and diversity of visitability initiatives and programs. The research explores trends in the visitability movement, as well as the challenges and controversies currently surrounding the visitability movement and potentially threatening its future success.

In the next twenty years, as millions of Americans reach their senior years, the nation will confront profound challenges in the domestic environment, including a lack of affordable and accessible housing. Although housing and neighborhood design affect everyone, the complex relationship between people and the built environment has a more significant impact on people with disabilities and the older population. Housing can either inhibit or facilitate the ability of these individuals to live and age successfully with independence and with dignity. As the population ages and the number of people with physical disabilities increases, existing paradigms of housing and neighborhood design must be given greater scrutiny from a lifespan perspective. Unfortunately, most of today's housing stock fails to meet the basic needs of these two population groups. Accessible residential arrangements that maximize individual autonomy and empower older adults and people with disabilities are extremely rare, particularly in the single family housing market.

Responding to the need for more accessible homes, changes in public policy and new design practices have emerged. Visitability, a concept that describes affordable, sustainable, and accessible design for single family housing, continues to gain popularity. This chapter discusses the origins of this new, inclusive design strategy, its components and goals, the rate of adoption by communities, and obstacles to its adoption.

"Visitability... describes affordable, sustainable, and accessible design for single-family housing."

Conducted between December 2003 and June 2004, this study sought to obtain a comprehensive understanding of visitability's history and document the most recent developments in its adoption. It builds on and updates research by Spegal and Liebig (2003) and Kochera (2002). The study included extensive Internet searches and postings on the visitability discussion list sponsored by the IDEA Center, and telephone interviews with federal, state, and local housing agencies, finance departments, and disability advocates' offices. Unlike earlier work, this study analyzed both existing and proposed initiatives to track the diffusion of visitability and explore reasons for the observed patterns. Moreover, it attempts to explain recent challenges and controversies surrounding visitability.

Because not all locations use the term "visitability," it is difficult to track the adoption of visitability across the country. Other factors complicating the research include the lack of an organization assigned to monitor visitability ordinances and ordinances and laws that often do not specify the agency responsible for implementation (Spegal & Liebig, 2003). To capture as much information as possible on new accessible-housing initiatives, this research used a loose definition of visitability. Thus, the results include some programs that neither specifically identified the three architectural features associated with visitability nor made visitability mandatory. As a result, this chapter uses the term "visitability initiatives and programs" rather than "visitability laws and ordinances."

The Need for Accessible Housing

Most single family homes, duplexes, and town homes have formidable barriers to people with disabilities. They often have steps at all entrances and hallways, and doorways too narrow for wheelchair use. Since most people in this country live in such housing, this lack of accessibility places seniors and neighbors with disabilities at a disadvantage in their social lives and

the housing market.

These accessibility problems negatively affect millions of Americans who have mobility impairments and, therefore, experience barriers within their own homes. This population includes, but is not limited to, people who use assistive devices. Approximately 6.8 million American residents use assistive devices to help them with mobility (Kaye, Kang, & LaPlante, 2000). Research also suggests that the use of mobility devices will grow with the aging of the population (LaPlante, Hendershot, & Moss, 1992).

A study published by the Department of Housing and Urban Development (HUD) emphasized the discrepancy between the need for and supply of accessible homes. Over one million aging homeowners have unmet housing needs. Many have serious home rehabilitation and modification needs that, if unmet, could force them to move or seriously reduce their quality of life (HUD, 1999).

These housing problems will worsen in the next few decades as the country's population experiences a major demographic transformation. Projections based on U.S. Census Bureau data indicate that the number of persons age 65 and older will grow to almost 40 million by the year 2010 (Jones & Sanford, 1996) and 70 million by 2030. In addition to living longer, people are now living longer with disabilities. The same advancements in medicine and technology that have increased the human lifespan now enable people to survive accidents and illnesses that were once fatal.

"the number of persons age 65 and older will grow to almost 40 million by the year 2010"

Federal legislation does not encourage accessibility in housing in the private market. The Rehabilitation Act amendments of 1977 and the Americans with Disabilities Act (ADA) only apply to housing constructed with government funding and only require five percent of the units in covered projects to be accessible. Although the Fair Housing Act Amendments of 1988 require all newly constructed multifamily housing with four or more units in elevator-equipped buildings to be accessible, since these regulations do not apply to single family homes they exclude the largest section of the housing supply.

The Advent of Visitability

Despite existing legislative limitations, new strategies to incorporate accessibility in single family housing are emerging and

gaining recognition. Recent legislation, advocacy movements, and shifting philosophies not only appeal to a greater segment of the population, they also strive to fill the current gap in housing accessibility by specifically targeting single family housing.

Unlike home modifications, where supportive features are incorporated to address residents' individual needs, visitability strives to provide a baseline level of accessibility in all new home construction in hopes of benefiting the entire population by creating accessible neighborhoods. Visitability is an affordable, sustainable, and accessible design approach that targets single family homes. Originating in Europe, the visitability movement was initiated in the United States in 1986 by Eleanor Smith, a disability rights advocate, and her group Concrete Change. She hopes to make all new homes not covered by current access regulations "accessible enough" for visitors with disabilities. A visitable home is intended to be a residence for anyone and to provide access to everyone.

"make all new homes... accessible enough for visitors with disabilities"

Many advocates and researchers view visitability as a major step towards achieving universal design on a neighborhood level. In acknowledging the valuable role of visitability in developing active communities, Truesdale and Steinfeld (2002, pp. 8-9) contend, "Although less than the ideal of a universally designed home, visitability is actually universal design practiced through community and neighborhood planning. It ensures that a basic level of accessibility will be provided in all housing, and, it opens opportunities for participation in community life." Data from the 2002 National Health Interview Survey (NHIS) confirm that building designs act as barriers to participation in community activities for many people. Among people with disabilities who reported that barriers limited or prevented their community participation, 43.1 percent mentioned problems with building design, such as stairs, bathrooms, or narrow doors (Hendershot, 2004). The built environment greatly affects whether or not an individual engages in their community.

Rather than force individuals to remain isolated and confined to their personal surroundings, visitability allows individuals with a variety of abilities to interact with each other and engage in community activities. It also provides benefits to a wide range of users, including those without disabilities

who may, from time to time, become temporarily impaired by their circumstances or environment.

Three Principles of Visitability

Visitability has three fundamental tentes. First, the inclusion of basic architectural access features in all new homes is a civil right that improves every person's ability to live productively and comfortably (Concrete Change, n.d.). People with disabilities should be able to visit their neighbors for mutual assistance, friendship formation, and childcare. Visitability strives to create opportunities for all neighbors in a community to socialize, help each other, and interact more effectively. It attempts to break down attitudinal as well as physical barriers to social integration of people with disabilities.

Second, visitability rests on the notion that through good design basic accessibility to single family housing can be provided, in most cases with minimal financial cost (Concrete Change, n.d.; Truesdale & Steinfeld, 2002). Incorporating accessible architecture features into housing designs during the early stages of development, before construction, remains affordable. Studies confirm that introducing visitability through retrofitting results in significantly higher costs.

Three principles of visitability:
1. Inclusion of basic architectural access features in a home.
2. Good basic accessibility at minimum cost.
3. Simplicity promotes implementation.

Third, simplicity promotes implementation. Prioritizing access features ensures that the supply of accessible homes will increase more rapidly. Visitability advocates argue that a long list of demands can create the misconception that all access features have equal importance, and must all be included in homes. A visitable home must meet only three conditions: 1) zero-step entrance; 2) doorways that have 32 inches of clearance; and 3) basic access to at least a half bath on the main floor. These features allow a person with mobility impairments to visit or live in a home, at least temporarily (Truesdale & Steinfeld, 2002).

The Visitability Movement

Recognizing the benefits of and growing need for more accessible housing, many state and local jurisdictions have joined the visitability movement. Several municipalities and states across the country have already formalized and enacted visitability programs. Despite their common goal of increasing the supply of accessible housing, these visitability programs vary

in the geographic regions they cover, the scope of features they include, and the strategy by which they are implemented and enforced. Some visitability initiatives are mandatory, requiring builders and homeowners to include visitable features during new construction. Others are voluntary or, perhaps, include additional architectural elements such as blocking for grab bars in bathroom walls and accessible environmental controls.

Mandatory Visitability Initiatives and Programs

In 1992, Atlanta, Georgia passed the first ordinance requiring basic visitability features in single family homes or duplexes built with any type of city subsidy, such as tax incentives, city loans or financial grants, land grants, or local dispositions of federal block grants (Kochera, 2002). The success of this ordinance led to similar legislation across the country, in cities such as Austin, TX (1998), Urbana, IL(2000), and Scranton, PA (2005), and states such as Georgia (1998), Texas (1999), and Kansas (2002).

Although most such legislation at the state or local level applies only to new publicly funded housing, some municipalities, such as Naperville, IL (2002), Pima County, AZ (2002), and Bolingbrook, IL(2003), have mandatory visitability legislation that applies to all new housing, including privately financed homes.

Voluntary Visitability ¡nitiatives and Programs

In lieu of mandatory visitability initiatives, some states and municipalities have chosen to support voluntary programs for builders, developers, and consumers to promote the integration of visitability principles in new housing. These programs include cash and tax incentives for builders and consumers, consumer awareness campaigns, and certification programs. In 1999, Irvine, CA established a Universal Design Program, which requires builders to provide consumers with a list of 33 optional accessibility features. The builders then must include any of the elements that consumers request. Consumer awareness campaigns also exist in San Mateo County, CA (2001), Albuquerque, NM (2001), and Syracuse, NY (2003).

Rather than approving a mandatory or incentive-based program, representatives in Visalia, California initiated a certification program in 2001. The voluntary "Visitable Home Pro-

gram" rewards builders with a certificate if they incorporate visitable features in their designs. The positive publicity often leads to additional clients and new projects. The EasyLiving Home program is another certification program designed to encourage builders of single family homes to incorporate several features that both increase the sellers' market and offer buyers a home easy for all to live in and visit (Concrete Change, n.d.). Established in Georgia in 2002, the EasyLiving Home (CM) program was developed by a group of public and private organizations to encourage the voluntary inclusion of key accessible features in single family homes. Extending beyond the three elements of visitability, the EasyLiving Home (CM) program also requires that homes have a bedroom on the main floor, some entertainment space and a kitchen to receive a seal of approval from the Easy Living Home Coalition.

"as of June 2006, 44 state and local municipalities had a visitability program in place"

Existing Visitability Initiatives and Programs

As of June 2006, 44 state and local municipalities had a visitability program in place. Table 2.1 presents a distribution of both the mandatory and voluntary visitability initiatives currently active in the United States.

It shows that visitability programs are geographically dispersed across the country, and although the most local programs are in urban counties, which have higher populations and housing densities, visitability programs also exist in suburban and rural locales. Furthermore, initiatives are not limited to the states in the west that are expecting the largest surge in their aging population. States such as Pennsylvania, Kansas, and Illinois also have visitability efforts.

Proposed Visitability Initiatives and Programs

The research identified eleven states with visitability programs and sixteen visitability initiatives underway in other states, counties, and cities. They range from organized groups of individuals who want to begin a visitability program to places in the final stages of developing a program. While the final outcomes of these initiatives remain uncertain, their emergence symbolizes a growing interest in incorporating more accessibility elements in both public and private housing.

	Mandatory		Voluntary		
	Mandates Tied to Public Funds	Mandates For All New Homes, Including Privately Financed	Builder Incentives	Consumer Incentives	Consumer Awareness Programs/ Certificate Programs
Local Initiatives	Atlanta, GA (1992)	Naperville, IL (2002)	Southampton, NY (2002)	Freehold Borough, NJ (1997)	Irvine, CA (1999)
	Austin, TX (1998)	Pima County, AZ (2002)	Houston, TX (2004)	Southampton, NY (2002)	San Mateo County (2001)
	Urbana, IL (2000)	Bolingbrook, IL (2003)		Escanaba, MI (2003)	Visalia, CA (2001)
	Fort Worth, TX (2000)			Pittsburgh, PA (2004)	Albuquerque, NM (2001-2002)
	Long Beach, CA (2002)				Howard County, MD (2001)
	San Antonio, TX (2002)				Onondaga County (2002)
	Iowa City, IA (2002)				Syracuse, NY (2003)
	Chicago, IL (2003)				Sacramento, CA (2003)
	St. Louis County (2003)				Prescott Valley, AZ (2005)
	St. Petersburg, FL (2004)				
	Toledo, OH (2005)				
	Auburn, NY (2005)				
	Scranton, PA (2005)				
	Arvada, CO (2005)				
State Initiatives	Texas (1999)	Florida (1989)	Illinois (2002)	Georgia (1999)	New Mexico (2001)
	Georgia (2000)	Vermont (2000)	Pennsylvania (2004)	Virginia (1999)	Easy Living Home Project in Georgia (2002)
	Minnesota (2001)				
	Kansas (2002)				
	Kentucky (2003)				
	Oregon (2003)				
	Michigan (2006)				

Table 2.1. Visitability initiatives and programs (Source: Maisel, 2006)

Challenges and Controversies

Visitability faces challenges. Critics question the legality of ordinances, the cost effectiveness of programs, and the feasibility of implementation. Home builders argue that besides infringing on homeowners' "rights," inclusive design costs too much and negatively affects the aesthetic quality of homes (Lawlor, 2004; Byzek, 1998).

Visitability supporters also disagree over the best strategies to promote the construction of accessible single family housing. Some supporters argue for mandatory visitability legislation; others see voluntary efforts as more feasible yet still effective. Advocates also disagree over the limited amount of accessibility included in visitability. Some believe that the basic access features typically required in visitability ordinances do not go far enough. Others see visitability as the best way to get some housing built now with at least a basic level of accessibility.

Confusion and conflict exist between visitability and other residential design philosophies. People incorrectly use the terms visitability and "aging in place" interchangeably. While the two share some characteristics, they have different goals. Whereas visitability strives to improve every person's ability to engage in social participation, aging in place targets older and middle-aged people by addressing their preference to stay in their own homes. Aging in place requires more accessibility features than visitability. The differences can slow policy development.

"New Urbanism" also has conflicts with visitability. New urbanists advocate the use of traditional neighborhood development (TND) to create pedestrian-oriented communities (NewUrbanism.org). While TNDs have many features beneficial to both older people and people with disabilities, such as narrow streets, a dense mixture of uses, and an emphasis on pedestrian life and public transportation, the housing designs often lack accessibility (Smith, 2005). For example, they often have steps at every entrance. Attempts to reconcile the two philosophies are underway. Representatives from the Congress for the New Urbanism and the visitability movement met in June 2004 at CNU XXII and in June 2006 at CNU XXIV to discuss the resolution of conflicts between the two approaches (New Urban News, 2004).

Besides these broad policy issues, visitability advocates from many cities and states with proposed initiatives cite reasons for delays in adoption. In California and New York legal restrictions may impede adoption of local visitability ordinances. Californians hold the position that their state law preempts any attempts to regulate privately funded, single family construction. Similarly, many visitability efforts in New York State have stalled because of laws that limit local legislation from exceeding the requirements of the State Building Construction Code. Consequently, many cities within those states have turned to voluntary efforts to promote visitability.

These potential barriers to the adoption of new visitability programs are compounded by the lack of visitable homes being built in communities that have already adopted visitability. Because many locations place numerous restrictions on the homes that must comply with ordinances and other mandatory programs, municipalities with established visitability programs are failing to build large quantities of visitable homes. For example, in Oregon (2000) accessibility requirements only apply to new rental housing units and, consequently, they exclude the single family housing market. Visitability programs in Minnesota (2001) and Kentucky (2003) only apply to homes financed with funds from the Minnesota Housing Finance Agency (MHFA) and the Kentucky Housing Corporation (KHC), respectively. This, again, limits the number of homes covered by established visitability programs.

Various broad and specific policy issues surrounding visitability may have to be reconciled to ensure the future success of this inclusive design strategy. Although interest in visitability has grown and the number of proposed initiatives has risen exponentially, the number of active initiatives appears to be leveling off (Figure 2.1). Because of the length and variability of time it takes to get an ordinance passed, many proposed initiatives may appear in the next few years. Additional research that tracks the progress of these proposed initiatives will help document the impact of the challenges and policy issues.

A Look to the Future

Regardless of these challenges, the visitability movement continues to advance. One indication of its popularity and continued support is a relatively federal bill, H.R.

1441: The Inclusive Home Design Act. It was first introduced in the House of Representatives in 2002 by Representative Schakowsky (D-IL). A revised bill was reintroduced on March 17, 2005, and it has approximately 36

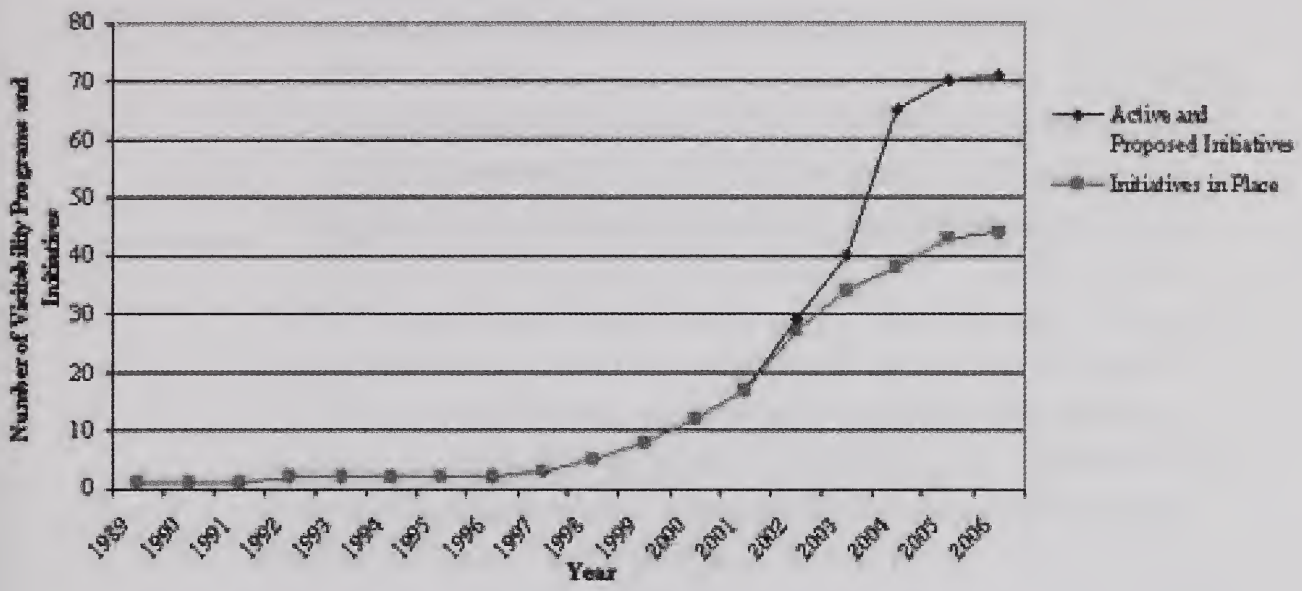


Figure 2.1 Total Number of Visitability Programs, 1989-2006 (Source: Maisel, 2006).

co-sponsors and the support of over 25 organizations. If passed in its current form, it would mandate that all federally financed housing include visitability features. This would help close the gap between the demand for and the supply of accessible housing available in today's housing stock.

Until federal legislation passes, the future adoption rate of visitability can be influenced by additional research as well as continued support from advocates, builders, and legislators. More definitive and comprehensive studies on the costs and benefits of visitability and research on the number of visitable homes built using each implementation strategy would help strengthen visitability supporters' efforts. Studies that demonstrate how visitability provides more accessible, safer, and more convenient homes would also demonstrate the effectiveness and general value of the concept.

As the demographic shift begins to compound the current lack of accessible housing and neighborhoods, more people will confront challenges in the accessibility and usability of their dwellings. Visitability addresses the need for more accessible housing, and recognizes that this need extends beyond

the multifamily housing market. Individuals who prefer to live in single family homes want accessible housing as well. Visitability provides an innovative, cost effective, and viable strategy for transforming and improving the nation's housing supply and meeting the needs of a changing population.

References

Byzek, J. (1998, May/June). The National Association of Home Builders takes on all comers in its unrelenting fight against building homes all of us can enter. *Ragged Edge Online.*

Concrete Change. (n.d.). Georgia's EasyLiving Home (CM) Program. Retrieved September 28, 2004, from http://www.concretechange.org/ga_easy_living.htm

Hendershot, G. (2004). *Building Design is Leading Barrier to Community Participation.* Washington, D.C.: National Organization on Disability.

Jones, M., & Sanford, J. (1996). People with mobility impairments in the United States today and in 2010. *Assistive Technology, 8,* 43-53.

Kaye, S., Kang, T., & LaPlante, M. (2000). Mobility device use in the United States. Disability Statistics Report (14). Washington, D.C.: U.S. Department of Education, National Institute of Disability and Rehabilitation Research.

Kochera, A. (2002). Accessibility and visitability features in single-family homes: A review of state and local activity (Report #2002-03). Washington, D.C.: AARP Public Policy Institute.

LaPlante, M., Hendershot, G., & Moss, A. (1992). Assistive technology devices and home accessibility features: Prevalence, payment, need and trends. Advance Data from Vital and Health Statistics, 217. Hyattsville, Maryland: National Center for Health Statistics.

Lawlor, J. (2004). Arizona court upholds wheelchair access regulations. American Planning Association, 70(3): 37.

Search is underway for accord on 'visitability'. (2004). *New Urban News.* October/November, 9, 7.

Spegal, K., & Liebig, P. (2003). Visitability: Trends, approaches, and outcomes. University of Southern California: The National Resource Center on Supportive Housing and Home Modification.

Smith, E. (2005). Activists call 'New Urbanism' to account over lack of visitability. Retrieved June 27, 2006, from http://www.raggededgemagazine.com/focus/esmith-newurbanism0705.html

Truesdale, S., & Steinfeld, E. (2002). Visitability: An approach to universal design in housing. Buffalo, NY: IDEA Center.

U.S. Department of Housing and Urban Development. (1999). Housing our elders. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

End Notes

1. This article is a reprint of Maisel, J. (2006). pp. 26-34 .Toward Inclusive Housing and Neighborhood Design: A Look at Visitability. Community Development: Journal of the Community Development Society, 37, 3.

2. Center for Inclusive Design and Environmental Access (IDEA Center), University at Buffalo, State University of New York (Visitability-List@Listserv.buffalo.edu).

3. Detailed spreadsheets of visitability initiatives and proposed programs and initiatives are regularly updated and available for download in multiple formats at http://www.ap.buffalo.edu/idea/visitability

4. The group included members from AARP of Georgia, Atlanta Regional Commission, Concrete Change, Georgia Department of Community Affairs, the Governor's Council on Developmental Disabilities, Home Builders Association of Georgia, Shepherd Center, and the Statewide Independent Living Council of Georgia.

Universal Design, Architecture and Spatial Cognition without Sight

3

Shohreh Rashtian

Abstract

The growing interest in Universal Design has produced many studies about modifying color, contrast, and glare to improve the accessibility of users with low vision and partial sight. However, spatial perception, spatial cognition, and navigation without sight need further study. Approximately 45 million people are blind worldwide; and the United States has more than 1.3 million people who are blind and 3.4 million people who are or have low vision (World Health Organization Program for the Prevention of Blindness and Deafness, 1997). This number will only grow as the population increases.

Designers, managers, legislators, and decision makers need better information on the needs of people with visual impairment and blindness. This chapter addresses the importance of being aware of the design needs of people who are blind or have low vision. It presents background information about the differences among sensory systems in perceiving and learning the environment, discusses spatial learning and navigation aids for people who are blind or have low vision, and offers recommendations on how to improve designs for everyone.

Differences Among Sensory Systems in Reporting Spatial Information

To design environments and products usable for all people including people with severe visual impairment and blindness, designers should consider the fundamental differences among sensory systems in reporting spatial information. Vision permits observation of a large area of space at one time from substantial distances. It enables an individual to comprehend the image of an object and its location, distance, and direction Humans can identify color and brightness through vision. Through long experience in deriving information from auditory and tactual senses, people who are blind learn to relate more effectively to non-visual aspects of their environment

than do people who do not have vision loss. Thus, for people who have vision loss or sight impairments, the auditory and tactual system becomes an important source of perceptual input. Because hearing conveys the distant environment, it helps individuals to comprehend their surroundings and to recognize and locate some objects and events in their immediate surroundings. Using their auditory system, humans can estimate the distance and direction of sounds. The auditory system also provides echolocation. By using reflected sounds, echolocation helps one detect the presence or absence of a surface or object outside of one's path. The haptic (or touch) system provides information only through proximal contact, but people cannot touch many things that they can see. They cannot reach some items, and other items are too delicate or dangerous to touch. The olfactory system detects the presence of odors, but it does not help much in locating the direction of the source. Also, few objects have distinctive odors.

"For the sight impaired, the auditory and tactual system becomes an important sources of perceptual input."

Challenges of Traveling and Spatial Learning without Sight

People who are blind code spatial relations through direct experience by using a frame of reference, learning object to self and object-to-object spatial relationships while taking care to avoid hazards and overcome obstacles.

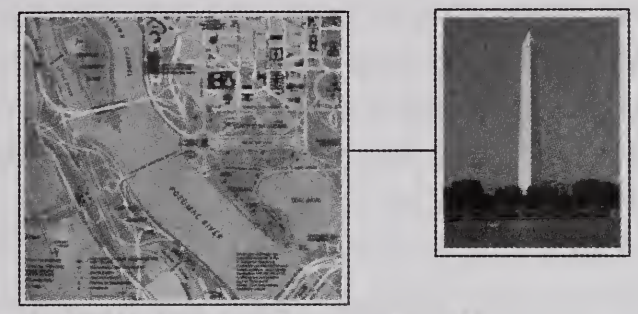
Travelers without vision loss can overcome their disorientation and resolve wayfinding problems by using multiple sources of information, such as signs, maps, street names, and directories. Lacking access to such information, travelers with vision loss face serious disadvantages and challenges, such as lacking the opportunity to preview information and to see distant landmarks and signage (Figure 3.1).

Current Wayfinding and Navigational Supports for People with Severe Visual Impairment and Blindness

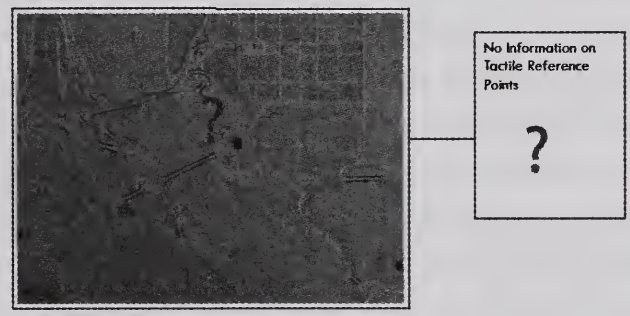
Since the 1970s researchers have tried to create navigation and wayfinding supports for people with severe sight impairment. These supports include:

- Mobility devices;
- Accessible traffic signals;
- Signage technologies;
- Wayfinding technologies;

- Spatial learning supports; and
- Tactile ground surfaces and environmental modifications.



UPDATING INFORMATION THROUGH USING DISTANT LANDMARK AND MAP



TACTILE MAP

Figure 3.1 Blind travelers need wayfinding cues

Mobility devices, such as canes and electronic travel aids, seek to detect hazards and obstacles a few steps ahead of the individual using them. Accessible traffic signals inform users when they can cross safely at light-controlled intersections. U.S. communities have used various kinds of accessible traffic signals for years.

Signage technologies include tactile and audible signs. Tactile signage, such as Braille signs, identify a particular space, but to read the sign the traveler must be near it, know where it is, find it, touch it, and read it. Only about 10 percent of people who are blind can read Braille. Furthermore, finding the room without having access to floor plan is very difficult. Researchers have developed new technologies for presenting text signs verbally. Remote, infrared, audible signage systems (trademarked as Talking Signs, TS, in the U.S.) are accepted by the ADA and ABA Accessibility Guidelines. Developed by Eye Research Institute (William Crandall, Smith-Kettlewell original developers), this technology uses an infrared beam system. A portable receiver within range (variable) and aimed in the direction of a transmitter can pick up a speech message,

transmitted directionally in a 56-degree cone. To receive the audible message, one must point the receiver toward the transmitter and be within the cone.

For wayfinding technologies, several projects have explored global positioning system (GPS) applications to help people with visual impairments find their way around.

Some researchers have worked on the development of GPS, MoBic system, Atlas Speak system; and Golledge and Klatzky created Personal Guidance System (PGS) to provide navigation assistance during outdoor travel. These systems determine the traveler's position and orientation in space, have a spatial database of the environment in which travel will occur, and have an interface which displays information to the user and allows the user to control the system. These systems support outdoor and urban travel, but cannot help indoors.

"any person moving through a building needs to have general layout information and a signage system"

Moving through a building, one needs to have general layout information and a signage system to make appropriate spatial decisions, recognize choice points, use short cuts, survive in emergency situations, and resolve disorientation. People who are blind have to systematically search the perimeter of a room to learn a room's size and shape and to identify properties of features on the walls. Then, through a grid pattern search and right-angle turns, they locate objects and features in the room. This makes the direct exploration of a building very time consuming. In many buildings, a person who is blind often does not have a chance to explore every room they enter, especially during a meeting in a public building; and unfamiliar areas present unknown hazards and obstacles that can make a direct search more difficult. Background noise and the lack of landmarks and cues add to the challenge of makes learning the layout of open and large areas.

Communities use tactile warning surfaces on curb ramps and on the edges of rail platforms to assist blind persons in detecting hazards along their path. Tactile directional path surfaces assist and improve navigation in large open spaces; but once inside a building, users who have visual impairments need better access to information about its layout.

Compared to printed information and maps, we have few tactile maps, and many of those available have problems: inconsistency with spatial cognition and wayfinding without sight, failure to recognize fundamental differences between

vision and touch, and the small percentage of the visually impaired population who can read Braille. The Nomad system (developed by Don Parkes at the University of Newcastle in Australia) eliminates the need for Braille labels or legends on tactile maps. Nomad Touch Blaster software and Nomad pressure sensitive pads and voice synthesizers run in conjunction with IBM-compatible computers. The pad has a matrix of pressure sensitive addressable points, each of which relates to some information in spoken or digitized form. Points or groups of points representing features are programmed to generate a tactile map that can appear in a pad that has 9600 addressable points at a resolution of 5 mm. The pad can present the information for each point or area in synthesized speech or digitized sound. Tactile Audio Maps resolve the problem of reading Braille labels but still users need to use the tactile map on sensitive pads. As a result, static information about layout of the building on the tactile map is inconsistent with the way people learn the environment without the use of vision.

Conclusion

To improve navigation for persons with visual impairments, we need a comprehensive knowledge of perception, cognition, and traveling behavior. Such knowledge, which has both theoretical and practical value, can lead to improvements in the design of products and environments for use by everyone. Successful solutions will:

- Have appropriate spatial representations for all, regardless of degree of their vision, and
- Incorporate tactile, audible, and feasible navigational reference points in buildings, and integrate tactile directional guides in the flooring of large public places, such as lobbies, airports and metro stations.

Universal Design in Public Transportation: "Segway" to the Future Sub theme: Safe, Seamless, and Dignified Community-based Public Transportation

4

Katharine Hunter-Zaworski

Abstract

Universal design in public transportation is the basis for universal access. In the U.S., accessible public transportation is a fundamental human right. This paper provides an overview of universal design principles as applied to public transportation. It introduces universal design issues for public transportation concepts, systems, and modes. Translink, the accessible multimodal public transportation system in the city of Vancouver, B.C., illustrates the successful application of these concepts.

Introduction

Everyone needs accessible transportation for access to education, employment, and to live independently. As embodied in the U.S. Federal Civil Rights legislation (Americans with Disabilities Act, ADA, 1990), Americans have a fundamental right to accessible transportation. A fundamental challenge in the planning, design, and operation of accessible transportation services is the accommodation of the diversity of human characteristics and abilities. Translink, an accessible, multimodal transit system in Vancouver, B.C., illustrates a number of aspects of universal design in accessible transportation.

All of us, the young, old, and in between, are users and beneficiaries of accessible transportation services. The added amenities associated with accessible transportation benefit all travelers. The National Center for Accessible Transportation (NCAT) has projects that are expanding the current understanding of accessible transportation. Instead of considering stakeholders as people with disabilities, NCAT approaches problems from the perspective of abilities. In design solutions, NCAT does not merely satisfy the "customer requirements", in the common approach to design, such as the "house of quality or quality functional deployment" but goes further to con-

sider design for experience and emotion. (Ullman, 2003). This chapter reflects the holistic and broad approach to accessible transportation that is the central mission of the NCAT.

Accessible transportation service has traditionally focused on providing transportation to individuals with obvious disabilities, such as people who use canes or wheelchairs. However, many people who have hidden disabilities depend more on public transportation than those with visible disabilities. Some of these less visible disabilities include epilepsy, traumatic brain injury, or chronic fatigue syndrome. Also, people with sensory impairments such as low vision or blindness cannot drive their own vehicles. Individuals who are hard of hearing or deaf require travel information in visual rather than audible modes; and many people with disabilities travel with service animals that are essential to allow them to live and travel independently. Accessible transportation must accommodate these animals.

"All people benefit from accessible transportation."

All people benefit from accessible transportation. Anyone who has traveled with a child in a stroller or with a bicycle or rolling luggage appreciates curb cuts, level boarding, and elevators. Absent-minded or distracted travelers benefit when travel information is presented in audible and visual formats.

Public Transportation

All of the links on a trip chain (Figure 4.1) must be accessible for the total trip to be accessible. If any link is missing or broken, it is unlikely that an accessible trip can be completed successfully. The chain has twelve modules. Pre-trip information, reservations, and schedules must be available in accessible formats. The civil infrastructure for the total route and the transition to the vehicles must be accessible as well. Many modules are not related to infrastructure or vehicles, but are still important elements of an accessible trip.

All accessible transportation systems have certain features that characterize the service and make it accessible. These features are discussed in terms of infrastructure, transport, and information systems.

Infrastructure

For any accessible transportation system the civil and

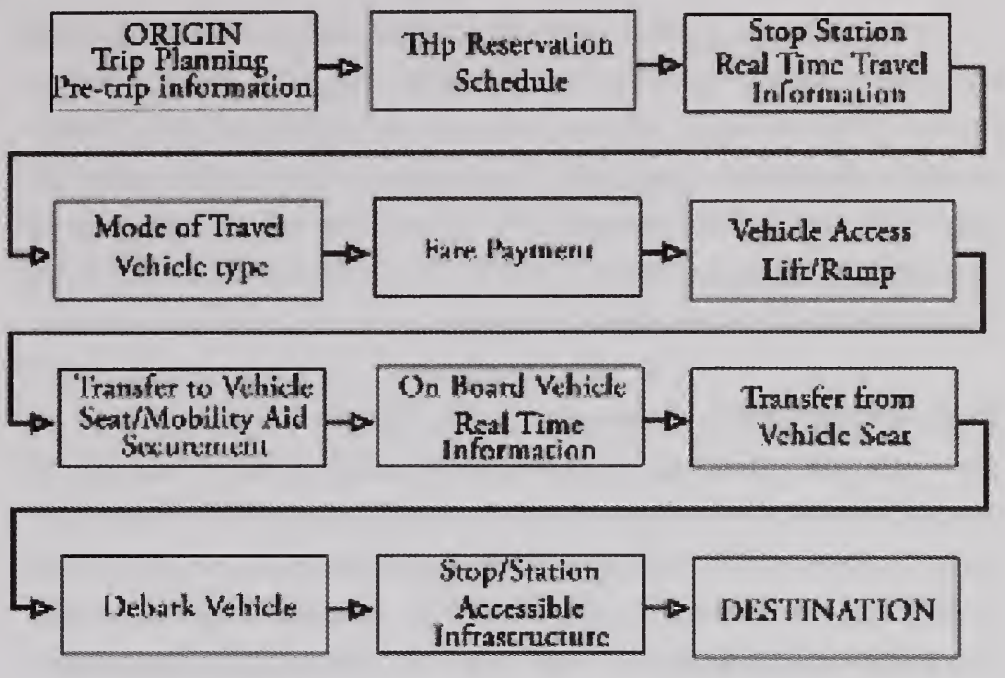


Figure 4.1. Trip Chain Conceptual Model

mechanical, or vehicle infrastructure must be barrier free. The civil infrastructure is often beyond the scope of public transportation providers because it is controlled by different agencies, such as a public works departments, airport authorities, or operating railroads. The infrastructure includes interfaces and transition zones such as terminals, stops, stations, and the local areas around these facilities like side walks and right of way. Typically, public transportation agencies are responsible for the design, procurement, and operation of the accessible vehicles that must interface with the civil infrastructure and facilities. The transition between the civil infrastructure and the vehicles presents a challenge. It is also the interface between a vehicle and a terminal; and it is often the broken "link" on the trip chain. Terminal designs must meet the Americans with Disabilities Act (ADA) requirements for buildings, and many vehicles must meet similar guidelines for vehicles. The interface, or "gap", between a vehicle and a terminal is often a problem because it is a regulatory "black hole". The gaps between the infrastructure and vehicle are bridged by lifts, ramps, bridging plates, kneeling vehicles, gangways, or other devices specifically designed to "bridge the gap." The Americans with Disabilities Act Accessibility Guidelines (ADAAG, US Access Board, 1998) for Transportation Vehicles provide specifications for this equipment. Howev-

er, the operating environment of public transportation is harsh and these devices require regular and ongoing maintenance. Public transportation systems that have high ridership by people with disabilities usually have regular and intensive maintenance programs for their accessible transportation equipment. As a result, many of these transit agencies also have excellent maintenance and reliability records.

Types of Accessible Transportation Systems

This chapter discusses community-based surface modes of transportation in common use in North America. These include urban public transportation provided by rubber-tired, steel-tired, or passenger ferry vehicles. Intercity public transportation modes include over the road bus (ORTB), passenger rail (e.g., Amtrak), and passenger ferry. Many large cities offer a variety of transportation modes, while others simply have one. The term "community" breaks down artificial silos of classification on public transportation. For example, New Jersey Transit provides statewide but community-based transit. Senior center based dial-a-bus service in rural America also provides community-based public transit services. All of these systems provide public transportation to the communities that they serve. The community may be a large city or a rural county, but each public transportation system is characteristic of its community. Now consider the modes of service.

Urban Public Transportation Modes

Two basic types of service—fixed route-fixed schedule and demand responsive—define urban public transportation. Fixed route service is provided by rubber-tired vehicles such as buses or by steel-tired vehicles such as metro, light, or commuter rail. Demand responsive service is usually provided by rubber-tired vehicles that range from personal automobiles, accessible taxis, and vans to small and large buses. Several North American cities have passenger ferry services that fully integrate into urban public transportation systems. They usually do not carry vehicles. Due to long-distance commutes in many regions, it is difficult to draw the line between urban public transportation and inter-city public transportation. In many places, urban public transportation modes provide service on route segments and trip lengths that inter-city public transportation modes

provide in other parts of the world.

Vehicle Accommodations

Vehicle accommodations include design elements on the vehicles that insure the safety of all passengers, such as safe stair geometry, contrasting stair nosing, and strategically placed stanchions, hand rails, and grab bars. Good illumination is important as well, particularly in stairways.

For vehicles with level boarding, design elements include wide aisles that permit transportable mobility aids to easily enter a vehicle and navigate the aisle to a securement location. Some vehicle design elements may increase the risks for semi-ambulatory passengers. For example, on transit buses the side-facing priority seats near the driver are dangerous for many older passengers because there are no stanchions for them to hold onto. Seats are often upholstered in easily maintained vinyl that can be slippery. Seat orientation is also important. Forward-facing or rear-facing seats provide more secure seating for older passengers, but these seats may not be located near the operator, and passengers who are older or have a disability may feel less secure. On rubber-tired vehicles, the interior should have hand holds and stanchions that provide a high level of contrast so that all passengers have something to grab onto in case of sudden speed changes. The floor surface and texture can also impact the ease of access to the vehicle. Slip-resistant, hard surfaces are recommended, and the use of carpet is strongly discouraged. Space should be provided for the safe accommodation of service animals.

As for the safe securement, the type and level of securement depends on the size or mass of the vehicle and its operating environment. (Zaworski & Hunter-Zaworski, 2004). Smaller vehicles need more robust securement systems, due to the acceleration forces transmitted to and experienced by passengers. Large urban rail systems operating on an isolated guideway do not need any mobility aid securement systems. Mobility aid securement systems must accommodate a vast range of mobility aids, and also meet the needs of the particular vehicle and its operating environment. Smaller vehicles (particularly those with a gross weight of less than 15,000 pounds) should have passenger restraint systems for mobility aid occupants. Although personal restraints are recommended, certain physi-

cal conditions may prevent their use, and some mobility aids cannot be safely secured by any commonly available securement systems. However, most of these mobility aids can be accommodated by "docking type" securement systems, but these require a hardware interface that attaches permanently to the frame of a mobility aid. Mobility aid users who drive a vehicle while seated often use these docking systems. Anchorage, Alaska is the only public transit system in the U.S. that uses docking type securement systems in regular fixed route operations. It has used it for ten years. With the advent of Bus Rapid Transit (BRT) in North America, rear-facing securement compartments (Figure 4.2) are an option for mobility aids that cannot be secured by belts or straps.

Figure 4.2. Rear-facing securement

Rubber-Tire Vehicles

Rubber-tire vehicles, used in public transportation range in size from small sedans providing demand responsive service to double-decked or articulated buses (long buses that bend in the middle) that can carry almost a hundred passengers. Several characteristics of rubber-tire vehicles pertain to accessible transportation. The vehicle mass affects the type and level of mobility aid securement and occupant restraint required. The smaller and lighter the vehicle the more robust the securement and restraints system must be to offer adequate occupant protection. Massive transit buses, by virtue of their mass and power transmission systems, experience low acceleration forces. The operating environment also influences the level of mobility aid securement and occupant restraint required. Vehicles that operate on isolated guideways or in exclusive bus lanes

have a more controlled operating environment than vehicles operating on congested urban streets, and thus do not face rapid accelerations or decelerations. Urban topography can also influence the options for mobility aid securement.

Rubber-tire vehicles have high or low floors. Typically, an accessible rubber-tired vehicle is equipped with a lift or a ramp. Recently, there has been a trend towards the procurement of low-floor vehicles for their ease of use. However, in areas without sidewalks, the ramps deploy at angles that are often too steep for users of mobility aids to access the vehicles independently. Some low-floor vehicles also have difficulty on non-paved road surfaces, but this is rare in urban operating environments. Low-floor vehicles do not have steps, making boarding and deboarding faster and easier for everyone than with high-floor vehicles (King, 1998) Ramps on low-floor vehicles usually accommodate larger mobility aids than many lifts, but this can cause problems. Many of the larger mobility aids are wider as well as longer than the footprint of a "common wheelchair." Even if these mobility aids can get up a ramp, many cannot get past a fare machine or maneuver to a securement station. In urban environments where the fleet includes both high- and low-floor vehicles, passengers with large mobility aids are stranded because not all trip segments are served by the same type of accessible vehicle.

Two disadvantages of accessible, high-floor vehicles are stairs at boarding and lifts. Many vehicles have a lift at the front of the bus that negates the use of stairs when it is deployed. The cycling of the lift and the time for securement and restraint add to the vehicle dwell time and detract from the on-time performance. Most lifts also limit the size of a mobility aid that can access a transit vehicle. Many high-floor and low-floor vehicles have a kneeling feature that reduces the height of the first step at boarding, but stairs present a barrier for many older passengers. High-floor vehicles are better equipped to operate in rural and unimproved areas where a lift may need to descend to the ground.

The type of operating environment also influences the type of access to vehicles. Snowy part of Canada and Sweden have rear-door access to demand responsive vehicles. Unfortunately, this approach relegates mobility aid passengers to the "back of the bus," where they are further from the driver and ride

behind the rear axle. The ride quality, particularly in smaller vehicles, is much better just over or behind the front axle. Since the enactment of the ADA in 1990, almost no research has been conducted on the dynamic characteristics of smaller vehicles (those less than 15,000 pounds GVW) in the United States.

Demand-responsive public transportation can serve either the general public or only eligible individuals. While federal regulations deal with complementary paratransit service, most agencies have their own procedures for determining eligibility (Weiner, 1998). Many suburban and rural areas have demand-responsive service available to all, and some rural regions integrate it with a school bus service. Demand-responsive public transportation usually requires a user to plan ahead and reserve a trip. Many agencies still prioritize trips according to trip purpose, even though this is prohibited by the ADA. They do this to deal with their major supply and demand problems.

Vanpools and carpools provide an option for many commuters. In Washington and Oregon, vanpool organizations provide accessible vehicles when requested (King County Metro). Accessible taxis provide more spontaneous service, particularly after hours or for visitors and tourists. In Portland, Oregon the accessible taxi service is regulated to make sure that service is available and affordable. However, many large cities in the U.S. still do not have any accessible taxi service. In London, England the accessible taxis are purpose-built vehicles with ow floors, ramps, and securement systems.

Bus Rapid Transit (BRT) is at the other end of the vehicle-size and operating spectrum. BRT includes rubber-tired vehicles, enhanced stations, and limited-use guideways or exclusive bus lanes, as well as the service amenities of light rail transit. There are a number of new vehicles that are being designed for BRT service, and they accommodate a variety of wheeled mobility aids, including segways, bikes, and strollers. Most of these new vehicles are articulated and have low floors that can accommodate three or more mobility aids. Rear facing securement compartments are being designed and procured for many of these vehicles These systems include a compartment that permits mobility aids users to travel facing the rear of the bus without being secured with belts or other devices. Rear-facing securement lets people travel independently and does

not involve a vehicle operator (Rutenberg & Hemily, 2003). Many of the new BRT vehicles also include "café" type seating so other passengers can also travel in rear-facing seats.

Steel-Tire Vehicles

Steel-tire vehicles include streetcars, light rail, heavy rail, and commuter rail. Typically, electricity from an overhead wire powers a streetcar and light rail transit (LRT), both of which run on rails in the street. Their stations are on part of the sidewalk area. Streetcars usually have a single car or unit, but are sometimes hitched into a "married" pair. LRT vehicles tend to be larger, and usually run in two-, four-, or six-car train sets. Many newer LRT systems have low-floor vehicles, while older systems run both high- and low-floor vehicles. The floor level influences the design of the stations. Some stations have mini-high platforms or wayside lifts to accommodate high-floor vehicles, but the trend is towards level boarding with low-floor vehicles. LRT systems run a mix of isolated guideway and on-street service, and the stations tend to have more amenities and nearly always include off-vehicle fare payment mechanisms.

There are no clear distinctions between light and heavy rail. Skytrain, which operates in Vancouver, B.C . uses light vehicles, but the system has all the features of a heavy rail system. A powered third rail provides the power, and the guideway is completely isolated. Linear traction motors permit the system to operate on steeper slopes than traditional rail propulsion systems because the motors "pull" the train along. In traditional rail systems the friction between the tire and rail is the limiting factor and restricts the grade or operating slope. Skytrain is similar to many systems that are completely computer controlled—there are no drivers on the vehicles. This type of control is only possible on systems that run on completely separated guideways. Computer-controlled systems can operate with shorter headways and better energy efficiency than operator-controlled systems. Isolated guideways cost more to construct than on-street systems, but are more flexible and have fewer capacity constraints. There are also trade-offs between construction costs and long-term operational efficiencies. Heavy rail urban systems run independently of street systems. In cities with large underground networks, these systems can also run in bad weather or congested traffic conditions.

Both LRT and heavy-rail, fixed-guideway systems also affect urban growth and development. Real estate values tend to increase within a quarter mile of stations, and decrease as the distance increases. In Toronto, Vancouver, and Portland, transit stations were catalysts for development and renewal.

Commuter rail systems use electric or diesel engines and usually provide longer distance service than urban rail systems. These systems operate multiple-car trains with stations spaced miles apart. In the U.S. many of these systems share the rails with long-distance passenger rail and freight operations. Some of these vehicles are bi-level and provide a "business" class service with on-board amenities. The passenger rail section discusses many of the similar features of commuter and inter-city rail. Stations that provide park-and-ride options for passengers are important for both urban rail and commuter rail service. Park-and-ride lots must provide accessible parking and accessible routes from parking to stations. Stations must be accessible, and transition zones between platforms and vehicles must be bridged by ramps (Figure 4.3), lifts, or bridging plates.

Figure 4.3. Bi-level vehicle with bridge ramp used by Sount Transit, Puget Sound, WA (Source: Paul Ryus).

Information Systems for all Transport Modes

The public information systems, fare machines, and safety and security amenities must be accessible to accommodate the needs of passengers with a spectrum of physical, sensory, and cognitive abilities (Figure 4.4).

Passenger Ferry Service

As many of the oldest and largest cities are major ports or harbors or are located on waterways, many urban transportation

Figure 4.4. Trimet's ticket machine is color coded for each step in the process (Source: Paul Ryus).

systems include a passenger ferry service. For most commuter systems, ferry vessels only serve pedestrian traffic. Because many ferry vessels and docks were designed and built years ago, they are not particularly accessible. Newer systems are better (Figure 4.5), and many old systems have undergone major overhauls to become more accessible. Forces of nature, such as tides and weather, often affect the slope of gangways, making even the most accessible ferries a challenge, but most passenger vessels accommodate mobility aids. However, on older vessels with raised doorsills, many restrooms may not be accessible.

Inter-city Public Transportation Modes

Inter-city public transportation modes include over the road buses, passenger rail service, ferry service, and air transportation. Typically, the vehicles and vessels are larger than those that provide urban public transportation, the stops are infrequent, and the trip segments and trip lengths are much longer than those of urban public transportation. Inter-city public transportation includes amenities such as food service and on-board lavatories. The major issues for accessibility on these modes include boarding the vehicles, on-board circulation, accessible on-board lavatories, access to amenities such as food service, on-board information and communication systems,

Figure 4.5. Translink's Seabus, Vancouver, B.C. with high rise development surrounding the Seabus and Transit Terminal (Source: Paul Ryus).

and safety and security procedures.

Passenger Rail

In the United States the accessibility of passenger rail depends on the vehicle and station design, and this varies regionally. The passenger rail vehicles that operate along the west coast differ from those in the northeast corridor. The rail vehicles on the west coast have newer stations, and most of them have low-level platforms. The "Cascades" service between Eugene, OR and Vancouver, B.C. uses "Talgo" train technology developed in Spain. The train interiors are accessible, and the service works very well for many people with disabilities. Boarding ramps are mounted to the interior of the train vehicles; restrooms are spacious and meet the needs of many people with disabilities. Wayside lifts are used in west coast Amtrak stations to access the West Coast Starlight. On this bi-level train from southern California to Seattle, WA, accessible accommodations are only available on the lower level, and many of the amenities, such as the dining car, are not available to passengers who use mobility aids.

Long distance train service that has accessible overnight accommodation is available, but it must be booked in advance. People who use wheeled mobility aids tend to have limited access to amenities on trains.

Over the Road Buses

Over the road bus (OTRB) transport includes inter-city buses. For discussion purposes, the public transportation aspect of this industry includes only regularly scheduled service, not the large charter coach industry. Amtrak operates a thruway bus service across the country either directly or under contract. In Oregon and Washington, Amtrak operates a fleet of accessible coaches, or thruway buses, that provide feeder service that interfaces directly with their mainline rail operations. The OTRB industry has adopted accessibility more slowly than many other modes. An accessible vehicle provides a lift at the front, middle, or rear (Figure 4.6). Most passengers prefer to transfer from their mobility aids to regular seats if they are able, but mobility aid securement is also provided. Passengers may also choose to travel in their own mobility aids.

Figure 4.6. An over the road bus, with a lift deployed.

Passenger Ferry

Inter-city passenger ferries may or may not transport motor vehicles—it depends upon the size of the vessel, trip length, and destination. Passenger ferry service is essential for accessing coastal communities. It should have accommodations for drivers and passengers who use wheeled mobility aids on vessels that carry motor vehicles and require or encourage passengers to leave their vehicles on board for the duration of their trips. This implies having accessible parking spaces that permit egress on either side of a vehicle and an accessible path to passenger amenities. Many older vessels have retrofitted elevators, and many newer vessels have accessibility features designed

and built in. Many ships have raised door sills between exterior doors and interior space, and throughout the vessel. Raised door sills are being removed to make interior circulation spaces more accessible to all. Stairs and raised door sills are barriers for everyone. Passenger vessels are also being retrofitted or designed with accessible lavatories. New vessels often include accessible unisex lavatories that meet the needs of families as well as individuals. Regulations for accessible accommodations on cruise ships and passenger ferries are still under development, so many vessels do not have ADA-compliant sleeping accommodations. Individual agencies will try to accommodate passengers with special needs, provided that passengers provide adequate advance notice.

Community Public Transportation

The term "community public transportation" crosses between the artificial silos and categorizations that are so prevalent in public transportation. Every community has characteristics that affect the type of public transportation that is available. Some result from local politics and attitudes, while others result from land use patterns, topography, and climate. The differences are important. Public transportation systems with strong community support often have high ridership or tax bond success. They also have strong and innovative programs for meeting the needs of transit-dependent passengers; and invest regularly in staff training and vehicle maintenance. The innovative agencies tend to try to go beyond what is required because "it is the right thing to do".

"Most of the innovative agencies are those that try to go above and beyond what is required because 'it is the right thing to do'."

All public transportation providers, whether they provide weekly senior bus service in a rural community or bus service in downtown New York, are facing ever-increasing challenges, including securing fuel for their vehicles; providing safe, secure, and affordable transportation; and operating within in the confines of local, state, and federal regulations. As fuel costs increase, the demand for public transportation will increase. For some agencies this will be the "tipping" point, while for others it will reaffirm their vital role in community life.

New Design Paradigm

The National Center for Accessible Transportation (NCAT) is the host of the Rehabilitation Engineering Research Center

(RERC) for Accessible Public Transportation. RERC focuses on access challenges of inter-city public transportation. The NCAT team works on projects that influence the design of the next generation of vehicles. It moves beyond silos and categorizations in a number of aspects of design and looks at the capabilities of the full human spectrum. This implies removing the "dis" from disability and developing new technologies that focus on capability and ability. The team also examines new design paradigms that go beyond merely satisfying customer or stakeholder needs to designs that also delight the user.

Ideas into Action

Good designs are a result of building consensus. Strong, respectful, and collaborative partnerships are essential to NCAT's design projects and most of its research activities. The design of accessible transportation vehicles and infrastructure requires finding solutions that may not be optimal but are based on consensus. Designs that favor one particular group of users may pose hazards for others. A prime example is a curb cut that does not include a detectable warning to provide information on the transition from a pedestrian to a vehicular environment. There is general agreement that a detectable warning is necessary to help delineate the transition zone, but it should also be noted that the consensus that truncated domes provide the only solution does not exist.

Case Study

Vancouver, B.C. is a world class city that started planning, designing, and engineering a multi-modal accessible transportation system in the early 1980s when the Provincial government mandated that the new urban rail system be barrier free. Skytrain is one of the first systems designed and built to be barrier free. A coalition of stakeholders and politicians with disabilities decided to make Vancouver's new public buildings and transportation system accessible to all. The government made this decision before there were any national or international design guidelines or standards for accessible design, and the concept "barrier free" was not very well understood. The B.C. Building Code Part 10 for building accessibility was the one of the first and most progressive codes of its kind. The passenger ferry service called Seabus was updated to be more

accessible. When Skytrain started revenue service in 1986, the City realigned a bus system that included both fixed-route and paratransit service to provide feeder service to Skytrain. In 1986 the fixed-route bus system was not accessible, but the region was served by an extensive network of paratransit operators who provided feeder service to the stations when the use of Skytrain began to decrease travel time. As the fixed-route bus system also needed to be accessible, in 1990, the operating company purchased new, large accessible buses. Initially this included lift-equipped, high-floor vehicles, but now all of the purchases are low-floor vehicles. Vancouver is one of the most accessible cities in the world as a result of progressive community attitudes. It did not become accessible because of regulations such as the Americans with Disabilities Act or the Canadian Charter of Human Rights. It became accessible because of the foresight of individuals with and without disabilities who required that new public buildings and the transit system be accessible. Interestingly, the mayor of Vancouver is a quadriplegic who uses a power wheelchair. In addition to the engineering aspects of the barrier-free system, the City developed public information and staff training programs to increase awareness and understanding of the needs of travelers with disabilities (Hunter-Zaworski, 1989). The consultant responsible for the barrier-free design of Skytrain worked with a large team of engineers, architects, and planners who also supported the mandate for a barrier-free system design. They often had to make difficult decisions that were contrary to those of politicians, but the design team prevailed in favor of access for transit-dependent individuals and public safety.

"Vancouver's transportation system is still one of the most accessible in the world."

In 2005 Translink, the operating company of the multimodal system, still strives for continuous improvement and has made a significant effort to identify and correct deficiencies to make a great system even better. Translink has engaged several consulting teams to evaluate the status of many aspects of the accessible transportation system. The teams reported (Nelson/Nygaard. 2005) that the Vancouver's transportation system as still one of the most accessible in the world. The stakeholders and Translink staff are savvy, progressive, and working on accessibility issues that most agencies do not even understand. Accessible transportation in Vancouver goes beyond transportation facilities and vehicles. The Province of British Columbia

has had a progressive building code for accessibility since the late 1970s. The public buildings built since the mid-1980s are designed to be accessible and barrier free. Twenty years after the start of service by Skytrain, people with disabilities in Vancouver can live, travel, and work independently. Skytrain is so popular that the demand for mobility aid accommodation in the stations, elevators, and vehicles often exceeds capacity. No one imagined the opportunities that accessible transportation would provide for all of the residents and visitors in Vancouver, B.C. The integrated, multi-modal transportation system in the region is a showcase for universal design and access for all.

References

Hunter-Zaworski, K. M. (1989, January). A Synopsis of Accessibility features of Skytrain – Vancouver's Rapid Transit System. *ITE Journal,* 23-27.

King, R. D. (1998). TCRP Synthesis Report 41: New Designs and Operating Experiences with Low-Floor Buses, TRB, National Academies, Washington DC.

Nelson/Nygaard. (2005, November). "Accessibility Status Report on Fleet and Facilities" prepared for Translink, Vancouver BC.

Rutenberg, U., & Hemily, B. (2003). TCRP Synthesis Report 51: Use of Rear Facing Position for Common Wheelchairs on Transit Buses, A synthesis of transit practice, TRB, National Academies, Washington DC.

Ullman, D. (2003). *The Mechanical Design Process* (3rd Edition), McGraw Hill.

US Access-Board (1998). The American's with Disabilities Act (ADA) Accessibility Guidelines for Transportation Vehicles, Part 1192.

Weiner, R. (1998). TCRP Synthesis Report 30 ADA Paratransit Eligibility Certification Practices, A synthesis of transit practice, TRB, National Academies, Washington DC.

Zaworski, J. R., & Hunter-Zaworski, K.M. (2004, December) Assessment of Rear Facing Wheelchair Accommodation on BRT Vehicles. IDEA Project T-38 Final Report, National Academies, Washington DC.

As Your County Gets Older...Planning for Senior Housing Needs in Howard County, Maryland

5

Stephen Lafferty

Abstract

Howard County, Maryland, located between Washington, DC and Baltimore, has a median age of less than 35 years, but by 2030, 31 percent of the population will be over 55 years old. As a result, the county studied the needs for and provision of housing for older residents. In 2004, this yielded a Senior Housing Master Plan. Working with an advisory group of residents, developers, and advocates, county officials crafted a report and a set of recommendations to create more units, assist older residents as they age in place, and address the need for affordable units. Two key concepts wove through the discussion: access to needed services and the principles of universal design. This chapter describes the issues, recommendations, and status of efforts to provide more senior housing in the county.

Approximately 70 percent of older county residents express the desire to "age in place." New efforts are needed to support their desire and also to ensure a supportive community. Modifications, renovations, and assistance are needed to help seniors remain in their communities.

While Howard County is a hot housing market for families, new, often smaller units are needed for aging residents. Fostering the development of senior housing units through new zoning regulations, attention to compatibility, and different types of units was examined. Howard County has also adopted universal design guidelines for the construction of new, age-restricted housing.

The greatest challenge is to create affordable units in a county with an average unit price of $450,000. The county is reconsidering density, housing unit allocations, and the use of its zoning regulations and new financing mechanisms to underwrite the cost of affordable units.

Introduction

Good planning brings vision, experience, and the successes and

failures of others together with the realities of the community, but good planning alone is not sufficient to address the needs of a changing jurisdiction such as Howard County, MD: affluent, highly educated, dynamic, well located, and aging.

How can a local government take on the challenge of meeting the housing needs of older adults? Howard County has many older residents who were tied to agriculture and a more rural life, as well as Columbia, Maryland "pioneers" who settled in that model community 35-40 years ago to join a more diverse, open, and creative community building. There are wealthy "active" adults, low-income seniors living in tax credit funded buildings, and thousands of older residents aging in place. Much of this chapter uses 2004-2005 data.

Howard County undertook its first Senior Housing Master Plan in 2004. It brought to the surface many critical issues, fostered discussions among groups that were not necessarily talking with each other, and led to important recommendations. The master plan is not radical, yet it raised some serious concerns with the County Council. What seemed like a basic endorsement resolution led to a delay, further discussion, and, finally, modified language that said that the recommendations of the plan would be "considered."

The master plan illustrates how the concepts and tools associated with universal design are translated at the planning and implementation stages. Lessons and strategies can be taken from the development of this Senior Housing Master Plan.

"The master plan illustrates how the concepts and tools associated with universal design are translated at the planning and implementation stages."

Howard County is a relatively small county that is located between the Washington, DC and Baltimore metropolitan areas. It has a young population of approximately 275,000 people with a median age of less than 35 years old. It is the third wealthiest county in the nation, with an annual household median income of over $90,000. It has the highest performing school system in the state of Maryland, a major factor in attracting and retaining families.

Geographically, the western and eastern parts of the county are divided by what is known as the Public Service Area boundary, with 40 percent of the land located in the rural west and 60 percent of the land in the east and serviced by sewer and water. However, approximately 84 percent of the residents live in the east. Columbia, the renowned planned community of the late James Rouse, has a population of approximately

100,000 people and was the impetus, 40 years ago, for the transformation of the county from its rural, agricultural roots to a more suburban community.

Howard County's population is aging. Over the next 25 years the over-55 age group is predicted to increase by more than 46,000 people, rising from 19 percent to 31 percent of the total population. At the same time the number of County residents aged 20 to 54 is expected to remain relatively level, at about 140,000 persons, while decreasing from 52 percent to 44 percent of the County's population. This growth in the older population mirrors similar changes throughout the Baltimore metropolitan region and the nation.

The shift to an older population will affect both every area of life in the county and county government programs and policies. In late 2003, the Howard County government initiated a Senior Housing Master Plan to examine one of the most significant areas of concern—the provision of adequate and affordable housing for older adults.

The need for a Senior Housing Master Plan was raised during public hearings on the county's 2004 Comprehensive Zoning Plan. As zoning amendments concerning senior housing were discussed, it became evident that other planning tools were needed to address the demand for new housing for older adults while maintaining the county's existing stable communities. Additionally, the County Office on Aging saw an increased need to support and assist seniors who wanted to age in place.

The initial workgroup on Senior Housing included representatives from the Commission on Aging, the Office on Aging, the Department of Planning and Zoning, the Department of Housing and Community Development, and the Department of Inspections, Licenses, and Permits. The workgroup found that the issues went beyond the development regulations for new housing. The county's housing stock, existing and future, needed to be evaluated in light of major demographic changes and the scarcity of land available for new construction.

The issues, questions, and data generated by the workgroup were presented to an advisory committee of representatives from the community and the development industry, advocates, organizations representing seniors, and county officials. The advisory committee met in the spring and sum-

mer of 2004 to study and discuss this difficult topic. Three subgroups developed recommendations related to existing housing, new construction, and affordability. The committee's recommendations were reported in the plan. In addition to the recommendations that will be described in this chapter, it is understood that the Howard County Senior Housing Master Plan will need to be revisited periodically. This periodic review will evaluate the effectiveness of the Plan's strategies in light of new market conditions and demographic data, the success in implementing the recommendations, and the ability to implement the Universal Design criteria.

Purpose of the Howard County Senior Housing Master Plan

The county's housing needs are changing due to the aging of its population and the serious challenge of affordability. Most of Howard County's housing has been built since 1970, and it is designed, primarily, for families with children. This reflects the market demands caused by the county's rapid growth as a suburban community. The older subdivisions have lots ranging from 8,000 square feet to an acre. Newer developments are being built with very large homes (i.e., an average of 3,500 square feet) on these and smaller lots. Although many "empty nesters", or retirees, continue to live in the homes in which they raised their families, the changing demographics suggest the need for housing developments or individual units designed for older adults.

The terms "older adults" and "seniors" are used interchangeably in this chapter to refer to persons 55 years of age and older. This is not intended to imply that this is a homogeneous population. The over-55 population includes persons still in the workforce, retirees, and adults in full health as well as frail elderly. Many prefer to remain in their homes, while others look for new housing with single-level living areas and lower maintenance requirements. Some seniors seek out "active adult" housing developments that are restricted to persons older than 55. Seniors with health or mobility limitations may seek out units accessible for wheelchairs and walkers such as assisted living or a nursing home, or they may decide to stay in place with in-home assistance.

In developing the Senior Housing Master Plan, it was rec-

ognized that Howard County's housing stock must evolve to meet the needs of an older population or the county will lose more of its long-time residents as they age and are compelled to look for housing opportunities outside of the county. If this population is lost, the county will lose family and community ties and the energy that fuels many volunteer-based organizations. It will also lose an important part of its tax base and other assets derived from the experience, diversity, and stability of older adults.

The development industry has been responding to a changing market demand for more housing choices. During the past ten years, the county has seen an increase in the number of active adult housing developments, senior apartment buildings, and assisted living facilities. However, county regulations and policies have not encouraged greater diversity in new housing products or modifications that make the existing housing stock suitable for older residents. The following sections describe the implementation challenges the county faced in meeting the needs of the county's aging population.

Master Plan Goals

The Senior Housing Master Plan sought to identify the problem areas, set strategies, and develop recommendations to ensure an adequate supply of safe, decent, and affordable housing for the older adults in Howard County. This grew from the Howard County's General Plan 2000, the county's blueprint for the future. The General Plan has three areas that establish policies affecting the housing stock needed to serve older adults: 1) Provide housing for older adults within stable, attractive communities through maintenance, renovation, and modification of existing homes; 2) Produce new housing that meets the needs of older adults and enhances existing neighborhoods; and 3) Provide affordable and diverse housing to meet the needs of the senior population.

Key Concepts

The master plan work group determined that, additionally, there were two concepts of pervasive importance to each of the three areas identified above. These concepts, the provision of services and universal design, were incorporated into each section of the plan as goals.

Provision of Services. Provide adequate and convenient access to services for all of the county's older adult residents. Appropriate housing cannot exist without needed services—retail and service businesses, medical and health care services, transportation, recreation, cultural and religious activities, and others. Seniors with good health and adequate incomes will find the services they need, driving longer distances or paying higher costs if needed. However, seniors with limited mobility, health problems, or limited incomes will have greater difficulty obtaining services and are more likely to experience declining health or diminished quality of life. The population growth will have a huge impact on hospital and other medical services, transportation, and community services. If essential services are not available within their communities, seniors may need to be uprooted.

The Senior Housing Master Plan focused on housing, not the availability of services; however, it does point to the need for coordination of services and housing. The county acknowledges this need, in small part, by requiring the provision of a community center and recreational facilities in age-restricted communities and the location of transit routes. The State also recognizes the importance of this linkage when it rates and ranks applications for tax credits for developing senior housing.

Universal Design. Create new housing using universal design principles and modify existing housing to incorporate as many elements of universal design as possible. Universal design is the design of products and environments so that they are usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. The intent of universal design is to simplify life for everyone by making products, communications, and the built environment more usable by as many people as possible at little or no extra cost. Universal design benefits people of all ages and abilities.

General Plan 2000 recognized the importance of universal design in housing constructed for older adults. Since 2001, the county zoning regulations have required that all new, age-restricted housing units incorporate elements of universal design. Guidelines were adopted that identify required, desirable, and customized items to be included.

The plan does not directly propose strategies for enhancing or increasing service linkage. Neither does it present a full discourse on or action plan for increasing the use of universal design. However, the plan and its implementation fully recognize the importance of both in addressing the housing needs in Howard County.

Existing Housing

New homes designed and built for older adults will be only a small portion of the housing needed to meet the needs of the aging population. The existing housing stock, most of which was designed for younger families, will continue to provide the housing for most of the county's older residents.

At the end of 2003, Howard County had 1,866 senior apartments or age-restricted (55+) active adult developments. In addition, assisted living facilities, nursing homes, and a continuing care community provided 2,248 beds. By contrast, the county's total housing stock was 97,782 units.

"five types of senior housing communities are: age restricted, independent living, continuing care retirement communities, assisted living, and nursing facilities"

According to the Maryland Department of Planning's Projections in 2000, Howard County is expected to have more than 63,800 persons who are 55 or older by 2010. Housing construction in the county is limited by growth management regulations to about 1,750 units per year. This includes an annual set-aside allocation of 250 units for age-restricted housing. Even if a substantial portion of the new housing is designed for seniors, it will accommodate only a small portion of the senior population. Most seniors will continue to live in existing housing.

Howard County has five types of senior housing communities:

- *Age-restricted Adult Housing:* These are developments of independent dwelling units with full kitchens that are designed for and restricted to households having at least one member who is 55 years of age or older. Age-restricted adult housing may include related facilities or services for residents, such as social, recreational, or educational facilities and housekeeping, security, transportation, or personal services.
- *Independent Living:* These are apartment buildings that provide housing for older adults and disabled individuals able to perform all of their own activities of daily living. Services are not provided within these buildings but may be brought

into them to enable individuals to age in place.

- *Continuing Care Retirement Communities (CCRC):* Also known as Life Care Communities, these offer independent living facilities as well as assisted living units (see below) and skilled nursing care.
- *Assisted Living:* This is a program that provides housing and supportive services, supervision, personalized assistance, health-related services, or a combination of these services to meet the needs of residents who are unable to perform, or who need assistance in performing the activities of daily living.
- *Nursing Facility:* These are facilities that offer non-acute inpatient care to patients suffering from a disease, condition, disability or advanced age, or terminal disease that requires maximal nursing care without continuous hospital services and medical services and nursing services rendered by or under the supervision of a licensed nurse.

Aging In Place

"Aging in place" refers to the ability to remain in one's home or neighborhood as long as possible and to be in control of those decisions which impact one's life. Surveys consistently show that most seniors prefer to stay in their familiar homes and neighborhoods. Developing and supporting programs that allow residents to age in place is good public policy for Howard County. Such programs enable more of the county's long-term residents to remain in the county, and provide for the continued use and maintenance of the county's existing housing as the population grows older. The Office on Aging's 2001 study of aging in place affirmed this goal of assisting all who want to stay in their homes and/or neighborhoods.

Most of the county's over-55 residents are homeowners, often living in homes with multiple levels and large yards. When older homeowners have physical limitations, home modifications and resources available in the community can make the difference between staying in a familiar home and neighborhood or moving. To help people age in places of their choice, the plan recommended strategies to address both the physical features of housing and the services needed in the community.

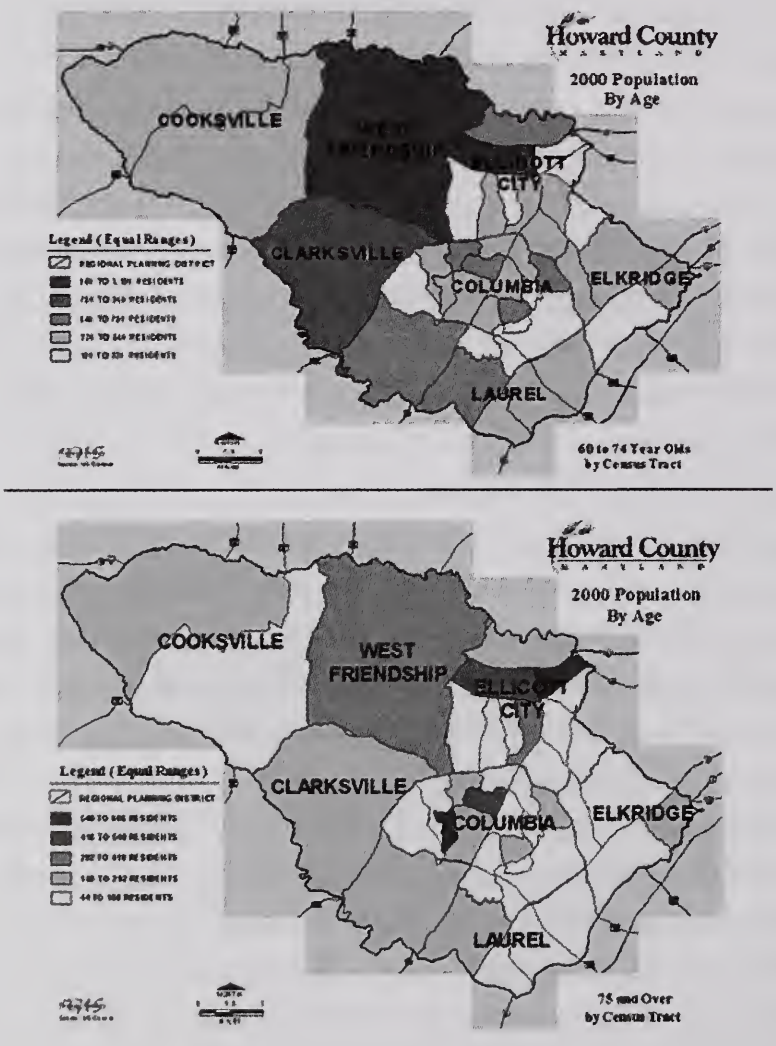
In 2001, the Office on Aging's Study of Demographics and Needs of the Senior and Middle Age Populations (REDA)

found that 70 percent of the county's older adults want to remain in or near their homes and 49 percent of those 60 and over express a need for home repairs. As a result, the office launched an Aging in Place Initiative to find creative ways to enable seniors to stay in the environments that they choose, to obtain services in their homes, or to move to other homes that can be more accommodating. The program provides the following: 1) Home visits and assessments by an occupational therapist or retrofit specialist to help senior homeowners determine the modifications that can be made to their homes to ease living with physical limitations; 2) Assistance finding and contracting with a contractor for home repairs or modifications; 3) Grants to cover the cost of labor and materials for repairs and modifications (funded with Community Development Block Grant funds) for low- or moderate-income homeowners, both seniors and those with disabilities; 4) A partnership between the Office on Aging and Rebuilding Together (previously Christmas in April), a community volunteer organization that does home repairs and modifications funded through the Community Development Block Grant program; and 5) Referrals to sources providing in-home health care and assistance, including a partnership with a service provider that uses sliding scale fees based on income.

Neighborhoods have natural cycles that correspond to the age or stage in life of their homeowners. Most Howard County neighborhoods of single-family detached homes were originally settled by young families. Many of Howard County's subdivisions are now neighborhoods with a high proportion of older residents. A term frequently used to describe similar communities throughout the country is Naturally Occurring Retirement Communities, or NORCs, defined as "seniors living independently residing in a facility or geographic area where more than 50 percent of the residents are over age 65." The Maryland legistlature passed a bill to estabilsh a commission to look at NORCs. Nationally, 27 percent of seniors living independently reside in a facility or geographic area where more than 50 percent of the residents are over 65. Over time, these neighborhoods often cycle back to being home to young families.

Although the senior population is distributed throughout the county, several areas show especially high concentrations.

The 2000 Census indicates that the Ellicott City region in the east, older villages of Columbia, and the western communities of West Friendship and Clarksville have relatively high concentrations of residents 65 or older. NORCs are likely to be found in these areas, as well as in communities in the east along the Route 1 corridor. These natural concentrations of seniors suggest that services such as transportation, home repair and modifications, and in-home health services are needed. The county currently has senior centers that serve all of the areas except Clarksville. Understanding NORCs assists in implementing the recommendations for referrals and information to connect older residents with the resources available in their communities.



Figures 5.1 and 5.2. 2000 Population by age, 60 to 74 year old, and 75 and over (Source: Howard County, MD).

Home Repairs, Renovation, and Modification

The county's existing housing stock is aging. Older adults who have limited mobility will have increased prob-

lems performing home maintenance tasks themselves. As costs increase and seniors' incomes stay the same, many will have more difficulty paying for basic maintenance and repairs. The seniors who have limited incomes are most likely to remain in older homes that will need the most extensive repairs. Those who are able to move often seek communities where they have little, if any, maintenance or responsibility.

A 2001 survey, reported in the 2002 Study of Demographics and Needs, found that older county residents had a need for assistance with home repairs and home or yard maintenance, particularly in finding and selecting contractors. However, it is very difficult to find professionals to take on small jobs needed for individual home maintenance. Some older homeowners need help with the process of contracting with a handyman or contractor. Older homeowners might be accustomed to doing these jobs themselves or may be faced with the need to take on tasks that a recently disabled or deceased spouse previously performed.

"Much of the existing housing does not allow for safe and easy movement or access for these physical limitations."

Much of the existing housing does not allow for safe and easy movement or access for those with physical limitations. In many cases, modifications are necessary. Some modifications are limited and relatively inexpensive, such as constructing sidewalks and ramps for access, widening doorways, replacing door handles, or adding grab bars to bathrooms. Other, more complex options could include creating complete living units on one level by adding rooms or installing bathrooms, installing elevators, or remodeling kitchens to be usable by those in wheelchairs. Modifications can be quite expensive. The Office on Aging provides home visits, assessments, and, in some cases, financial assistance to modify houses to allow aging in place. In addition, the National Association of Homebuilders (NAHB) has begun to certify contractors as "Certified Aging in Place (CAP) Specialists". Contractors receive training and take continuing education courses to receive the certification. NAHB reports that the Maryland program is small, with just 31 CAP Specialists. Its expansion holds promise for addressing the challenges of using the existing housing stock for an older population. There are five specialists in Howard County.

Unfortunately, the county's Office on Aging has limited resources to help seniors get home repair work done or to help

finance the repairs. There is a small home modification program, and the county's non-profit Rebuilding Together program also provides some support. Fortunately, since Howard County has numerous resources, volunteers, service and faith organizations, homeowners, and community associations, the potential exists to multiply these services.

Universal design principles provide valuable guidance in home renovation to allow one to age in place. Homeowners do not need to wait until they are elderly or have limited mobility before incorporating universal design features into their home renovations. Community education about the benefits of universal design could encourage young, middle-aged, or active senior homeowners to use these principles when designing additions or undertaking renovations. A housing stock that has universal design features can increase options for many county residents or potential residents, especially older adults.

Accessory Apartments

Accessory apartments are one option for making existing single-family homes more usable for older residents. Accessory apartments can be created by converting part of a home into an apartment or by building an addition to a home to accommodate an apartment. Senior homeowners may create an accessory apartment for themselves, while younger family members live in the remainder of the house. Senior homeowners may also create an apartment and rent it for additional income or have a younger family member live in the apartment, providing support and companionship. Homeowners may also create an accessory apartment as a home for an aging parent or relative.

The zoning regulations allow homeowners to create accessory apartments in single-family detached homes in most residential districts, with approval of a building permit. The house must be owner-occupied and the accessory apartment no larger than 800 square feet in floor area, or no more than one-third of the floor area of the dwelling. An apartment larger than these limits can be approved as a conditional use. Given the county's need to diversify its housing stock for a changing population, and given the size of many of the county's single-family homes, the size limit of 800 square feet is no longer appropriate and needs to be increased. A proposal in the 2005

Comprehensive Zoning process would have increased the maximum square footage, but that change is held up due to a citizen's referendum.

Assisted Living, Nursing Facilities, and Community-Based Services

In 2004 Howard County had 88 assisted living facilities and two nursing homes that together provided 1,954 beds. One continuing care community provides independent living units, assisted living, nursing care and has an additional 294 beds.

In early 2004 the large assisted living facilities in the county, ranging in size from about 50 to almost 300 beds, were 87 percent occupied, while the small facilities, accommodating from four to 16 seniors, were at 73 percent of capacity. One of the nursing homes was at 92 percent of capacity.

Based on the number of available beds, the supply of assisted living and nursing care beds appears to be sufficient. The State of Maryland has indicated this much, since it will not allocate any additional beds to Howard County. However, low- and moderate-income seniors who would benefit from an assisted-living arrangement are not always able to afford these facilities. The Office on Aging administers State and County funds to help make assisted living facilities affordable for low-income seniors. In fact, Howard County is one of the few counties in Maryland that contributes county funds to supplement the State subsidy. Unfortunately, based on the number of applications made to the Office on Aging, the available funds do not meet the current need. The unmet need for assisted living placement among low- and moderate-income seniors is a concern that must be monitored as the senior population increases.

Maryland's Older Adult Medicaid Waiver provides an alternative to Medicaid-funded nursing home care for seniors. The Waiver allows funds to be used for home modifications and in-home care or for placement in an assisted-living facility for persons who would otherwise have no alternative to nursing home care. At this time, Maryland is not funding the program for new applicants. Expanded funding should be advocated to provide seniors with alternatives to nursing home care.

Program and Policy Recommendations

Based on the principles, concerns, and facts applicable to the county's existing housing, the master plan laid out specific recommendations. The County Office on Aging has the primary responsibility for coordination and implementation of most of these recommendations. In a few areas, the Departments of Inspections, Licenses, and Permits or Planning and Zoning are the lead agencies.

The Plan proposed short-, mid-, and long-term recommendations. The short-term recommendations included: 1) Expand the Office on Aging's capacity to provide consultation and guidance to older homeowners who need home repair, maintenance, renovation, or modification services; 2) Develop partnerships with community groups, local businesses, government agencies, real estate specialists, contractors, service organizations, and faith organizations to educate about and provide maintenance needs; 3) Create, maintain, and disseminate a list of individuals or businesses able to provide home maintenance and repair and lawn/landscape maintenance; 4) Educate consumers about universal design in home renovation, remodeling, and expansion projects, emphasizing the benefits for all; 5) Promote an increase in the number of local Certified Aging in Place Specialists; 6) Increase the size of accessory apartments allowed, by right, within owner-occupied, single-family detached dwellings; and 7) Streamline procedures for approving building permits for renovations, repair, and modifications.

In the next five years, it recommended incentives, such as property tax credits or abatements, for renovations that meet universal design standards.

It also had the following specific long-term recommendations related to the county's assisted living, nursing facilities, and community-based services: 1) Assess whether there are sufficient assisted-living facilities in the community, particularly those that are affordable to low and moderate income seniors and 2) Maintain advocacy for public funding for the Medicaid Waiver for Older Adults program to support community-based living.

New Housing

Howard County has a limited supply of land remaining for

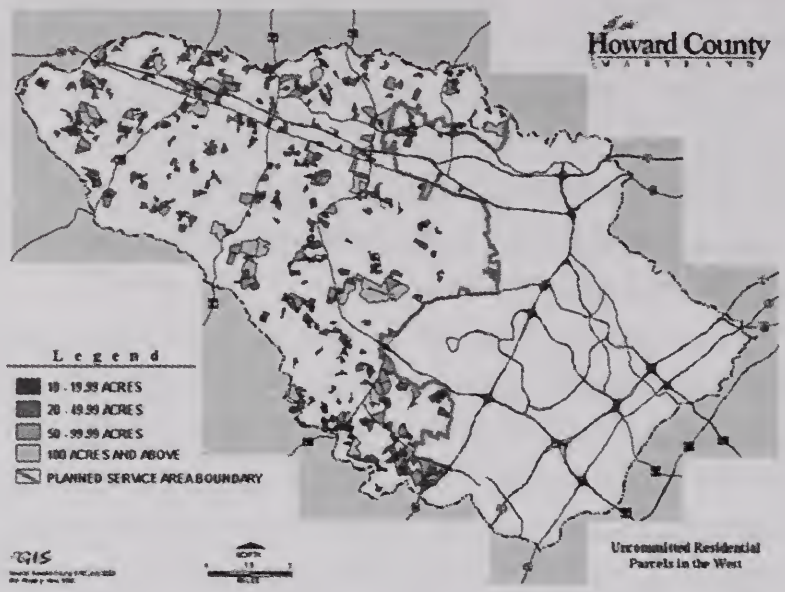
new development. Based on the current zoning regulations, build out is expected by 2030. The demand for housing in the county is high, and most types of housing built will sell without difficulty. It is important that the remaining, limited land be used to provide housing that will meet the needs of the changing population and not detract from the county's existing communities.

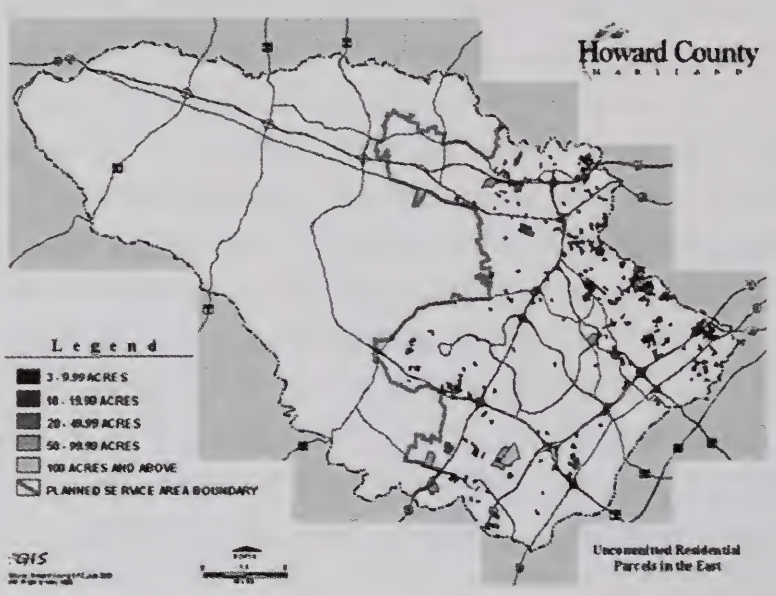
Most housing being produced for older adults is built under the zoning provisions for active adult housing. Only a small amount of senior housing is being produced in zoning districts allowing multifamily development. At least two housing developments in the county are "senior by design," having no legal restrictions to limit them to older adults, although the units are designed for and being purchased by seniors.

Howard County remains a hot housing market for families. Most of the single-family detached and attached dwellings being built have two to three floors and are not designed to be easily accessible, except for the small proportion of attached dwellings in active adult communities. Most new apartment developments are garden apartments without elevators, and they provide few units accessible to persons with limited mobility. Given the expected increase in the older population, what should the county do to encourage a greater percentage of new housing be designed for seniors? The master plan looked at current regulations and recommended a number of changes.

Growth Management System

Howard County has had an Adequate Public Facilities Ordinance (APFO) since 1992. This is a critical tool for directing growth to areas with adequate infrastructure and for pacing the rate of growth and development. Prior to adopting the APFO, the county was averaging more than 3,000 housing units per year. Under our current standards, 1,750 allocations are available annually, with build out expected by 2030. Housing unit allocations are the first step towards construction of homes in the county. By limiting the number of allocations, the county has slowed "build out." Slowing the growth allows the county to better manage and provide the required infrastructure. However, it is also a significant factor in the rapidly escalating costs of housing. The cost of housing in Howard County has nearly doubled in the last five years, going from a





Figures 5.3 and 5.4. Uncommitted residential parcels in the West and the East.

"Part of the boon in creating age-restricted housing is avoiding the 'test' for school capacity."

median sales price of $236,421 in 2000/01 to $417,627 in 2005 (Development Monitoring System Report, Jan. 2006). Single-family attached and condominium units have increased the fastest. There were over 6,900 home sales in 2005.

Housing for older residents is encouraged through a set-aside of 250 units per year out of the total allowed allocations in the eastern portion of the county. The requests are placed in line in the order they were approved to receive the available housing allocations. Senior housing plans, at a rate of up to 250 units per year, are given immediate approval. After the 250-unit set-aside is used, plans for senior housing must com-

pete for allocations with other submissions, although these plans still have an advantage in that they can be built in areas where the county schools are over capacity. The "schools test" has had a major impact on closing out non-age-restricted development in three Planning Areas.

Part of the boon in creating age-restricted housing is avoiding the "test" for school capacity. Developers have been able to move ahead, providing an added benefit for older residents. In 2005 484 age-restricted units were built; over 700 units were approved from October 2004 to September 30, 2005; and as of September 2005 nearly 1200 units were proposed in development plans in process. However, while the number of units may seem impressive, it cannot meet the demands of the growing population. It should also be noted that age-restricted communities are, generally, being occupied by active adults between the age of 58 and 62. These communities are too new to determine the average length of stay.

Zoning Regulations

Since the 2000 General Plan was adopted, several provisions have been added to the zoning regulations to encourage the construction of age-restricted housing. This is housing for households with at least one member who is 55 years of age or older and no permanent household members who are less than 18 years of age. The new regulations recognize the lesser impacts of senior housing on a community due to the smaller average household size and the lack of school-age residents. These regulations replaced older ones dealing with senior housing. The need for the new regulation was immediately evident as developers seized on the new opportunity in early 2001. Since the adoption of the regulations, nine active adult housing developments have been built, with a total of 871 units. Nearly 2,000 more units in sixteen developments have been approved or in process since that time.

All age-restricted development must incorporate universal design elements, provide at least ten percent of the units as Moderate Income Housing Units, provide an indoor community space, and have covenants that limit the units to sale or rental by older adults. Those plans submitted after March 2001 for conditional uses and after April 2004 for the Planned Office Research (POR) zoning district are also required to have

universal design features. Under the Howard County Zoning Regulations, age-restricted housing is allowed in residential zoning districts as a conditional use. This use allows detached, attached, and apartment units at a greater density than the underlying zoning.

In most districts the conditional use allows about twice the number of dwellings permitted without the conditional use. Conditional use requirements include perimeter setbacks and at least 35 percent open space. The Planned Senior Community (PSC) District allows age-restricted housing, assisted living facilities, and nursing homes. It is a floating district that allows moderate-density development (up to 12 units per net acre) on sites large enough to accommodate at least 50 dwelling units (if it increases the number of affordable housing units). Three other districts also allow age-restricted housing as a matter of right. In each, the permitted density is greater than many other districts in order to encourage more compact development.

"customers want homes that are not much smaller than the ones they had, but want more amenities and complete living units on one floor"

Design Diversity

Builders of "active adult" housing have found a ready market for their products in Howard County. They report that customers want homes that are not much smaller than the ones they had, but want more amenities and complete living units on one floor with non-essential living space on other levels. They want units with less maintenance and more services. Condominium communities that require no maintenance by the homeowners, even if the homes are detached, are most popular.

However, the active adult housing that is being built and successfully marketed in the county does not meet the needs of all of the county's seniors. These units appeal primarily to older adults who are still working. They are not affordable for most county residents. Developers and builders are not providing homes that are on single-levels with low maintenance unless they are in age-restricted communities. The county also has limited housing suitable for older seniors who can live independently but would prefer a much smaller unit than those currently being built.

There has been a shift to the construction of attached units, but these are usually tract construction of villas and

town homes. No builder has focused on small units, cottages, or ranch style units. In large part, this is due to the costs of land and development. Legislation was recently passed to provide allocations, specifically for one- and two-bedroom units.

Design Compatibility

Many of the remaining undeveloped parcels with residential zoning are small and surrounded by established neighborhoods. Sites of five acres or less have the potential to provide an important resource for people to age in place. If used for age-restricted housing or small assisted living facilities, these sites would allow older residents to find new housing in or proximate to their own neighborhoods and provide options for older adults who would prefer not to live in communities limited to older adults.

Redevelopment is becoming more economically attractive. Currently, an active adult housing development is being built on land that formerly had three single-family detached houses. In some neighborhoods older homes are being demolished to allow construction of larger new homes. The possibility of redevelopment expands the potential for new development within established neighborhoods. At the same time, it is important that infill development and redevelopment of small parcels be compatible with existing, older neighborhoods.

Sites of less than ten acres have proven to be the most difficult to develop for age-restricted housing in a manner compatible with existing neighborhoods. Larger properties, when developed either under the conditional use provision or the PSC (Planned Senior Community) zoning district, generally have their own character and identity and can be set apart from the surrounding community by open space, perimeter setbacks, roads, and other features. Although their design features are important, they are able to fit into the larger community in part because they are set apart from existing homes.

Under the Zoning Regulations in place from 2001 until 2003, R-20 (Residential—Single Detached) sites as small as four acres could be used for age-restricted housing under the conditional use provisions, at a density of five dwelling units per acre with a minimum of 20 units. However, as a result of a proposal to build an out-of-scale project of 28 age-restricted units as an in-fill development, the regulations were changed.

Community residents successfully argued that the scale and massing of the project would be grossly incompatible and was out of character with existing homes. The County Council amended the regulations to require that the minimum development size be as few as 20 dwelling units in some single-family detached zoning districts (RC, RR, R-20, and R-12). Now at least ten acres are needed in R-20, where potential sites are the most likely to be found. The changes acknowledge the continuing need while balancing the neighborhood concerns.

Increasing the minimum development size solved the immediate problem by eliminating small sites for age-restricted housing. However, this is counter to the goals of increasing the diversity and the quantity of housing designed for older adults. The master plan committee that developed the Plan felt that there were design solutions that would allow senior housing to be built in character with the existing neighborhoods.

One approach would be to build "multiplexes," or buildings that look like large houses but actually contain three or four units that could be more affordable. These housing units would be visually compatible with the surrounding housing but would have smaller units for more older adults. Other regulatory requirements for age-restricted housing for smaller sites, such as the following, would also need to be addressed:

- The landscape character of the sites must be designed carefully to ensure that small developments blend with existing homes and yards;
- The required 75-foot perimeter setback takes up a greater percentage of the land on smaller sites, making it harder to design homes that fit into the neighborhood; and
- Generally, there is limited room on smaller sites for a transition along the perimeter to make the entire site reasonably compatible with neighboring properties.

Universal Design Requirements

Beginning in 2001, the zoning regulations required plans for age-restricted housing to show how universal design features would be incorporated. As a result, a task force comprised of members of the building industry, advocates, and county officials developed a set of guidelines to be applied to all subsequent development. Since cost was of utmost importance to the builders, the county's guidelines focused on the universal

design features with the highest potential benefit in relation to their cost. The guidelines have features that are "required", such as a no-step entrance, 36" doorways and hallways, blocking for grab bars and adequate maneuvering, and turning areas in kitchens and bathrooms. The "desirable" and "optional features" are features that a builder could provide or that a builder and purchaser could negotiate. Unfortunately, negotiation requires knowledge and education by both parties. This has been sorely lacking in Howard County, but is one area upon which the Office on Aging is focusing.

The Department of Planning and Zoning's guidelines ensure that housing can be easily modified for residents who find themselves in need of additional features to ease accessibility later in their lives. Developers report that homebuyers in active adult communities often do not perceive themselves as needing universal design features. This comports agrees with national findings that suggest that most who buy into active adult communities see themselves as healthy individuals who do not need these features. Nevertheless, these housing communities need to be designed to allow long-term independent living by seniors who may find that they need these features as they age in place.

When the zoning regulations were changed, a number of projects were grandfathered. The projects that are subject to universal design are those applications for conditional uses and Planned Senior Communities filed after March 5, 2001 and the POR plans submitted after April 1, 2004. As of now, there are 16 developments with nearly 1,700 units where universal design features are required. The number of units reinforces the importance of using universal design features.

Since the adoption of the master plan, the Departments of Planning and Zoning and Inspections, Licenses, and Permits and the Office on Aging have revised the guidelines and worked with advocates and developers on the challenges of the no-step entrance. The guidelines require one no-step entrance per unit. While it is highly preferable to have this be a front or external entrance, construction difficulties may require using an entrance through the garage as an alternative.

The land where age-restricted housing is now being built or proposed has significant topographical and grade issues. The houses being built are generally tract or production houses

with basements. Therefore, construction of houses with no-step entrances has presented significant challenges for builders, who tend to build the same housing type instead of custom units. The county has been urging builders to be creative in design and engineering, but only a few have tried to find solutions. A local advocacy group recently presented awards to two builders for their efforts to use universal design. Since there is no waiver to any of these guidelines, county agencies have been able to push for solutions throughout the review and construction processes.

Program and Policy Recommendations

Changes in land use policy and regulations were deemed essential for fostering new senior housing in the county. The rising cost of land and its diminishing availability requires more diverse and creative design. To encourage more design and price diversity for 55+ housing while ensuring that infill senior housing is a good neighbor to existing housing, various short-term recommendations for the zoning regulations were proposed. The Department of Planning and Zoning is the lead agency in researching and drafting land use regulations to implement many of the recommendations. The Departments of Housing and Community Development, and Inspections, Licenses, and Permits area also important collaborators. Some of the recommendations follow: 1) Allow conditional uses for smaller senior developments in RC, RR, R-20, and R-12 Districts in conjunction with revised and enhanced design requirements, enabling developments of 20 or more dwelling units rather than the current minimum of 50 units to be built; 2) Amend the conditional use for age-restricted housing and the PSC District to improve compatibility with the community, with special attention to sites smaller than ten acres, including: a) Create clearer criteria for the required landscaping; b) limit the total building area per acre while allowing a greater number of units if they are smaller; and c) Limit the total building length and size for attached units to be more architecturally compatible with surrounding neighborhoods; 3) Allow age-restricted housing in dwellings (multiplexes) that resemble single-family houses located in single-family detached neighborhoods; 4) Amend the conditional use for age-restricted adult housing in western Howard County to allow housing in business zones

where there is access to appropriate services; 5) Promote universal design features in new, non-age-restricted housing and educate consumers and the construction and real estate industries regarding the benefits of universal design; and 6) Create a Design Advisory Panel to review compatibility of new, age-restricted adult housing on sites in existing neighborhoods.

To support an increase in the construction of more senior housing units, the following recommendations were made: 1) Amend Zoning Regulations to provide more opportunity to use small, infill sites in the RC, RR, R-20, and R-12 zoning districts for age-restricted housing and to encourage creation of smaller units; 2) Encourage accessory apartments in new or existing single-family detached homes; 3) Increase the annual allocation set-aside of 250 units for senior housing if linked to an increase in moderate income housing units.

Mid-Term recommendations to be addressed over the next five years include: 1) A periodic review of the universal design guidelines to determine appropriateness and cost-effectiveness; 2) A determination of whether there is flexibility in development requirements to promote creativity and innovation; 3) Research of culturally-appropriate design features or services for different segments of the senior population; 4) A determination of whether the Howard County Housing Commission projects can use alternative designs such as multiplexes, cottages, zero lot line dwellings; and accessory apartments; and 5) Identification and evaluation of incentives to encourage builders to incorporate universal design features into new housing.

"To provide housing appropriate for seniors, there must be reasonable provision of the services that will be needed by residents."

Affordability

Housing affordability is one of the most difficult issues facing Howard County. Prices for all types of housing have escalated rapidly over the past five years for both new and existing units. Additionally, renovations and modifications to existing homes have become more expensive.

Housing affordability is also a very significant issue for a substantial number of older residents. Over the last seven years, starting with survey data in 1999, approximately 30 percent of Howard County adults over 60 have had household incomes less than 40 percent of the median, or less than $29,000. Another 29 percent have incomes between 40 percent and 80 percent of the median. In its 2002 Study of Demographics

and Needs, the Office on Aging also reported that: 1) Younger seniors tend to have a larger income, with 62 percent of those 60-64 earn more than $50,000; 2) Adults over age 75 are twice as likely as those between 60-74 to have incomes under $20,000; 3) Senior females are more likely to have annual incomes under $20,000, with 36 percent of females reporting yearly income under $20,000; and 4) Males are twice as likely as females to have annual incomes of $50,000 or greater with over 50 percent of senior men reporting incomes of at least $50,000.

To provide housing appropriate for seniors, there must be reasonable provision of the services that will be needed by residents. The county's over-60 age group reported that about 70 percent had no limitation on their activities of daily living, 12 percent had a single limitation, and 18 percent had multiple limitations. On average, seniors with lower incomes reported higher numbers of ADL limitations. The relationship between housing and services cannot be ignored.

The implication of these numbers is dramatic. How can the housing needs of nearly a third of the older residents be met? What about those with even moderate incomes?

Standard measures for determining housing affordability do not generally apply to seniors since assets play a larger role than income. Affordability is influenced by the available down payment and other demands such as health care and rising utility costs. Equity from their prior homes and low debt enable some seniors to purchase homes that would not be affordable based only on income.

For many seniors, owning their home outright allows them to live on a modest income. The major source of affordable housing will continue to be the existing housing in Howard County. As discussed previously, financial or practical assistance with repairs and modifications, which enable seniors to remain in their existing homes, can address more of the county's housing needs than new construction.

Moderate Income Housing Units

Since the adoption of the General Plan 2000, requirements to build Moderate Income Housing Units (MIHU) for seniors have been added to the zoning regulations. Generally, in any housing development that is restricted to older adults, at least

ten percent of the units must be affordable for households with incomes between 50 and 80 percent of the median household income for the Baltimore region. In 2005 this meant a household income range of $33,650-$53,840. These households are not eligible for low-income, subsidized housing and would, generally, be priced out of the vast majority of Howard County's housing market.

The MIHU program is administered by the Department of Housing and Community Development (DHCD), which qualifies potential buyers and renters and retains enough control over the housing units to ensure that they remain affordable in successive sales or rentals. Through a shared equity program, DHCD assists first time homebuyers in purchasing units, and also ensures that there is a financial benefit to the buyer at time of sale.

The MIHU regulations allow developers to build some moderately priced units off-site, rather than creating obligation by building within the development. This has proven especially useful for senior developments because the condominium fees and taxes cause the monthly expenses to be too high for moderate-income purchasers. These condo fees are high because the buyers of these homes want amenities and maintenance-free living. Ideally, units would be priced so that the combination of mortgage plus fees would be within the ability of moderate-income buyers to pay, but condominium fees can also rise based on maintenance and repair costs. The county is limited in its ability to adjust these fees by State law.

The Department of Housing and Community Development has built two rental apartment buildings for moderate-income seniors using this off-site approach. The county is currently seeking to change its code to further increase the flexibility of developers, allowing more off-site transfer, a different housing type to be built, or the payment of a fee-in-lieu in exchange for providing more MIHUs.

Developers can also meet their MIHU obligations by repairing and renovating existing homes. Fifty thousand ($50,000) dollars must be spent on an existing dwelling to meet the obligation. To be used for senior housing, an existing home would need to be repaired and modified to meet universal design requirements, then sold to a moderate-income senior. As with new units, the Department of Housing and

Community Development retains some ownership so that it can exercise control when the unit is sold to a moderate-income senior.

Affordability for the 80-110 Percent Income Range

The income eligibility requirements for potential purchasers of MIHUs limit the number of potential buyers and do not serve those with incomes between 80 and 110 percent of the median of $72,155. According to data from the Multiple List Service, the average house now sells for more than $450,000. As of May 3rd of 2006 realtors reported that only 50 of more than 1,000 houses on the market cost less than $270,000. Because housing prices are so high in Howard County, even residents in this group have difficulty finding affordable housing. However, since the definition of MIHUs is established by federal and state programs, people in this income range cannot utilize any federal funds to help them purchase or rent housing.

This Senior Housing Master Plan focused on two approaches with the best potential to provide the housing needs of middle-income seniors. One is to make use of the existing housing stock and assist those who wish to age in place. The second is to encourage production of more senior housing and a greater variety of housing for seniors by encouraging accessory apartments and smaller, new units.

Program and Policy Recommendations

The creation and retention of a sufficient number of affordable housing units remains the primary challenge. New approaches must be considered. For most of these, the Department of Housing and Community Development will coordinate and implement the recommended actions, but the Department of Planning and Zoning will lead on some.

The plan stresses the importance of providing zoning and regulatory incentives and standards to encourage the creation of more Moderate Income Housing Units (MIHUs). In the short term, it recommended that the county consider zoning incentives to increase the number of MIHUs in age-restricted housing, including the following: 1) Eliminate the indoor community space requirement if a higher percentage of MIHUs is provided or if the site is within two miles of a senior center; 2) Allow higher density as an incentive for increased MIHU per-

centage for larger age-restricted developments; and 3) Allow additional density in the PSC (Planned Senior Community) zoning district if a higher percentage of MIHUs is provided along with increased setbacks or buffering from surrounding properties; 4) Consider increasing the allocation set-aside for senior housing above 250 units per year with a higher percentage of required MIHUs; 5) Continue to allow the MIHU obligation associated with senior housing to be satisfied through renovation and modification of existing homes; 6) Revise the zoning regulations to encourage some of the new market-rate dwellings to be built as smaller units; and 7) Support acquisition of accessible housing units (such as ranch homes) that can be maintained as affordable units by the Howard County Housing Commission and nonprofit housing providers.

"The master plan was developed by a broad-based group of county citizens."

With the cost of housing escalating, the plan recommends more financial incentives for the creation of more MIHUs to keep more senior housing affordable. For this, the short-term recommendations included: 1) Create a Housing Trust Fund to increase the supply of affordable senior housing through new construction or modification of existing homes using fees paid in lieu of providing required moderate income housing, bonds, transfer taxes, and county general funds as funding sources; 2) Acquire houses that can be renovated to incorporate universal design elements and selling or renting the homes to moderate-income seniors; 3) Establish a loan pool with private lenders to facilitate and help underwrite the acquisition of houses that are affordable to moderate-income seniors.

The mid-term recommendations include considering: 1) Tax Increment Funding legislation for the construction of new, affordable units; 2) A tax abatement or credit for improvements where the dwelling is maintained as an affordable unit; 3) Tax relief to moderate-income renters of age-restricted units, parallel to the real estate tax relief provided to homeowners with incomes below a certain threshold; and 4) A reevaluation of the schools' portion of the $1.80 excise tax obligation ($1.00 per square foot) on MIHUs for seniors if more MIHUs are provided than are required for the particular development.

Conclusion

The development of Howard County's Senior Housing Master Plan was important to understanding and addressing the

housing needs of older adults. For the aging population to have adequate housing choices, the public and private sectors must get more creative and pro-active.

As the master plan was developed by a broad-based group of county citizens, it reflects concerns about preserving existing housing and enabling people to age in place; increasing the number of new for sale and rental housing units for older adults; making new construction more compatible with the surrounding community and more accessible and visitable for consumers; and finding more ways to make housing more affordable in a county with soaring housing costs.

Since the Plan's adoption steps have been taken to change zoning regulations, expand needed services, alter the universal design guidelines, and tackle the challenge of affordability. While the changes are only starting, Howard County has firm commitment to ensuring that as the county ages its diverse housing needs will be met.

References

Howard County Department of Planning and Zoning, (2000). Howard County General Plan 2000.

Howard County Department of Planning and Zoning, (2002). Research Report: 2000 Census: Age Characteristics.

Howard County Department of Planning and Zoning, (2004). Research Report: Columbia.

Howard County Department of Planning and Zoning, (2006). Development Monitoring System Report, Howard County Maryland.

Howard County Office on Aging, (2002). Study of Demographics and Needs of the Seniors and Middle Age Population in Howard County.

REDA International for Howard County, Office on Aging, (2001). Status of Seniors in Howard County and the Aging in Place Initiative.

6

Making universal design work in zoning and regional planning: A Scandinavian approach

Olav Rand Bringa

Abstract

Universal design may well be the most innovative and significant development to reach the planning sphere in the past several decades. It presents a holistic approach to how to deal with the interaction between humans and the environment. The core of this thinking revolves around the important issue of accessibility for people with reduced functionality based on equal opportunities and equal rights.

The Norwegian Government is in the process of integrating universal design perspectives into various aspects of national planning policy. This is a direct result of advances achieved through preliminary policy development and pilot projects over the last years. County and municipal plans comprise the main targets for the new initiatives, which address a number of issues in strategic planning and zoning. The process of integrating universal design into planning policy includes revising the Planning Act, expanding government impact assessment regulations, developing and issuing national policy guidelines, and raising the overall levels of professional competence.

This process opens new issues for discussion and clarification. What is the relationship between universal design, sustainable development, landscape development, and protection of the cultural heritage? Are the universal design principles consistent with the full scope of the definition of the concept?

Introduction

Activities in connection with the UN Convention on Disability Rights are now moving into their crucial final phases, and it is expected that the convention will be adopted by the General Assembly in the fall of 2006. If this is the case, then a lack of accessibility for individuals with disabilities will become officially recognized as an act of discrimination. This hardly comes as a surprise; equality and full participation in society for people with disabilities has long figured on the international po-

litical agenda. The United States Americans with Disabilities Act non-discrimination legislation transformed these political ideas into an effective policy tool. Many nations have followed this example, implementing efforts to further refine policies and instruments in an ever-growing number of spheres.

The classification of accessibility for people with disabilities as a fundamental human right has wide-ranging ramifications. Although principally aimed at strengthening the rights of people with disabilities as individuals, the responsibility for safeguarding these rights lies with a host of public authorities and private organizations. Ensuring that people with disabilities achieve equality and full participation in society is no longer a matter for the health and care services sector alone. Most other areas of society will need to be involved for such measures to be effectively and successfully implemented.

The emergence of equality perspectives has forced us to think in new ways about how to achieve accessibility in practice. A given accessibility problem will often have a myriad of potential solutions. Universal design thinking calls for solutions that, as far as possible, are available to everyone. It avoids specially adapted solutions devised only for people with reduced functionality, and argues that good solutions go beyond accessibility. They must satisfy other requirements such as safety, sustainability, aesthetics, and affordability. Although many people with reduced functionality will still require special aids and solutions tailored to their specific needs, the principle of universal design provides a constructive basis for integrating accessibility thinking into ordinary societal processes. To solve the challenges, we must think beyond the design of individual products, buildings, and means of transport. We must see things in a bigger perspective, and work to establish universal design principles as a dynamic component of county and municipal planning procedures. This takes us into subject fields and aspects of government administration that are new in the context of accessibility. We must incorporate the new tool of universal design into the existing legislation, methodology, and administrative entities for community planning. Norway is in the process of integrating it into national planning policy. Before discussing those developments, I will offer some background on Norway and the Norwegian planning system.

"We are currently in the process of integrating universal design perspectives into national policy in Norway."

Norway, Denmark, and Sweden Together Comprise the Area of Northern Europe Known as Scandinavia.

The countries of Scandinavia have much in common, including history and language. All three have constitutional monarchies, similar social and administrative structures, and are typical welfare states with mixed economies. They share similar planning legislation and planning administration systems. They differ as well, not least in terms of their geography.

The renowned French Impressionist Claude Monet, who visited Norway in 1895, wrote in a letter to a friend: "Norway is a country far less awful than I had expected."

Figure 6.1. Norway with county borders (Source: Norwegian Map Authority, Ministry of The Environment).

The southern tip of Norway lies at the same latitude as Fort McMurray in Canada. The Northern Cap is as far north as the northernmost portion of Baffin Island. The name "Norway"—path to the North—is fitting. Yet, thanks to the Gulf Stream, which brings warm currents from the Gulf of Mexico northward, tempering the waters along our jagged coast, the country has a surprisingly moderate climate. That said, no part of Norway is without snow at some time during the winter.

Mainland Norway, not including Svalbard, covers a total area of 324,000 sq km, or nearly three times the size of Ohio. Of this, 1.4 percent is cities and towns and 3.2 percent is cultivated as agricultural land. The rest is forest, mountains and plateaus, and lakes and glaciers. Twenty percent of Norway's land area is located at or above 900 meters above sea level. This

poses a special set of challenges in the context of accessibility in land-use planning. Few developable areas outside of agricultural land have a low incline, and we have stringent restrictions limiting the use of agricultural land for purposes other than farming.

Figure 6.2. Rural landscape in Western Norway.

City and town areas, some of which are up to 1,000 years old, long ago expanded beyond their original flatlands, moving up the valleys and mountainsides. With just 4.6 million inhabitants, Norway is one of Europe's most sparsely populated countries (population density, 15 people per sq. km. compared to Ohio at 97 people per sq. km.). Almost 80 percent of the Norwegian population lives in urban and town areas, which means we have constant pressure to develop new land areas. This applies in particular to Oslo, the country's capital and communications hub, as well as its administrative and financial center. Oslo is home to the Royal Family, the national assembly, the government administration, and a host of important national institutions.

The Planning System

A key factor in land-use policy is the protection of land areas. The management of land areas must comply with national and international policies relating to conservation of the landscape and environment, protection of threatened species, and preservation of cultural monuments. At the same time, a proper framework must be established for energy

Figure 6.3. The capitol Oslo in winter.

production, communications, and industrial activity, among other things. The government lays down principles for regional and local planning activity through government reports (white papers) and national policy guidelines.

The Planning and Building Act is a key tool in the planning and assessment of various considerations in land-use allocations. It encompasses activities relating to planning as well as building, but since this chapter focuses on planning I will, for simplicity, refer to it as the Planning Act. The Planning Act, administered by the Ministry of the Environment, the national planning authority, applies at all government administrative levels in Norway. Norway is divided into 19 counties, consisting of a total of 431 municipalities. The largest of these is Oslo, with 550,000 inhabitants, while the smallest has only 212.

"decision making must be democratic and decentralized"

This may sound rigid and overly centralized, as municipalities obviously have different capabilities to deal with planning tasks. Some may be tempted to invoke the words of the economist John Kenneth Galbraith, who said: "You will find that the State is the kind of organization which, though it does big things badly, does small things badly, too." However, the Planning Act rests on principles of democratic and decentralized decision-making. Publicly elected bodies at the various administrative levels make all planning decisions within a framework laid down by the relevant superior authority. Planning processes are transparent. The Planning Act ensures that proceedings are public and open to participation from individuals and organizations. This gives special interest groups, such

as one for persons with disabilities, every opportunity to take part in municipal planning processes. Of course, transparency does not prevent bad decisions, but it does increase the chances of decisions based on consideration of the greatest number of factors possible. In the event of conflicting considerations or questions regarding violations of the rules set out in the legislation, the final decision-making authority lies with the Ministry of the Environment. The ministry also is responsible for implementing any adjustments to planning policy or planning legislation deemed necessary by the government. Major policy shifts and legislative amendments must be submitted to the Norwegian national assembly, the Storting, for approval.

Norway's efforts to incorporate universal design and accessibility into planning policy across the board center on the county and municipal levels. Each county administration (or municipality) draws up a county (or municipal) master development plan with a 10-12 year perspective. At least once every four years, these plans go through a political review, with revision if warranted. The annual administrative budgets devise action programs for plan implementation and follow-up. The master development plans have two parts: a community part that coordinates the physical, economic, social, aesthetic, and cultural development of the county or municipality; and a land-use part that establishes the use of land area and natural resources in the relevant area. The land-use part of a county master plan lays down guiding principles for the municipalities. It is a legally binding document. Before use of land areas commences, municipalities must prepare zoning plans that specify in more detail the exact use of each area,

Community planning systems have different organizations in different countries. In democratic countries, planning systems constitute a powerful instrument for developing regions and local communities and using resources and land to the benefit of society and the population in the short and long terms. The planning process is never free of conflict; conflict is at the very heart of the planning sector, which must deal with political agendas and ideologies. For accessibility to get proper attention systematically, and in the right contexts, the universal design strategy must become an integral part of prevailing community and land-use planning processes.

Where Does Universal Design Come into Play in Regional Planning?

The Norwegian government issued a circular identifying topics to incorporate into county and municipal plans, and it also designated a clear national policy in this sphere. County and municipal administrations are expected to integrate national policy into their planning processes and translate it into good, cohesive solutions at the regional and local levels. The government circular offers a starting point for assessing the main approaches relating to the planning process and the role of universal design strategy. An abbreviated list of relevant topics includes:

1. The regional planning system
    - Agenda 21. Follow-up of the Rio Declaration on Environment and Development
    - Considerations relating to security and emergency preparedness
    - International cooperation
2. Sustainable development and resource management
    - Planning for utilization and conservation
    - Biological diversity
    - Watercourses
    - Resources available to agriculture, forestry, fisheries
    - Daily life and local communities
    - Development policy and transport
    - Energy production and consumption
    - Waste management
3. Quality of life and welfare
    - Children and youth policy
    - Living conditions and housing construction
    - Health promotion and preventative efforts
    - Hospitals
    - Mental health care
    - Rehabilitation, work, and activity
    - Care of older adults
    - Measures for substance abusers
4. Culture, education, and research
    - Cultural, sports, and recreational activities
    - Education
    - Life-long learning

- Research and studies

5. Industrial sector and working life
   - Planning for industrial development
   - Information and communications technology
   - Innovation and restructuring
   - Agriculture, forestry, fisheries, and reindeer husbandry
   - Regional development programs

Accessibility for individuals with reduced functionality fits under the social policy component of the plan. Point 3, Quality of life and welfare, is the natural candidate. It encompasses plans for institutions, housing, and rehabilitation, and covers employment measures and activities for special groups. Although this component provides an important backdrop for accessibility thinking, it will not adequately reflect the realities of society, national targets, or international directives. People with disabilities live everywhere, work everywhere, and want to go where everybody else goes. National policy is directed at full participation and equality, and international directives such as those from the UN are moving in the same direction. Thus, all the topics on the list should be reviewed with an eye to equality and accessibility, with the goal that all areas of society function well for all inhabitants. Universal design is the relevant strategy for devising concrete measures.

Before a closer look at the core universal design approaches in land-use planning, consider some examples in planning where the strategy has relevance, and where one could incorporate management and guidelines into municipal planning.

Waste management planning involves finding waste deposit sites, establishing facilities for recycling and energy production, organizing waste collection, and determining figuring out logistics. Consumers play an important role here. They should put their trash in places for collection. A home waste-sorting program should allow all consumers, including people who are blind or have low vision, to sort their waste efficiently into easily differentiated trash bins. Without such a program, one needs easily differentiated trash bins to enable all consumers, including those who are blind or have low vision, to sort their waste efficiently. Municipal guidelines stipulating the use of different colors and clear marking of trash bins can provide an efficient means of dealing with this issue.

Urban environments also often provide larger-scale waste receptacles for trash and waste deposits. They take up a lot of space, and often clash with their surroundings. They also present obstacles to use. The waste deposit opening is often high, hard to find, and has a heavy cover to lift (Figure 6.4).

Figure 6.4. Typical waste receptacle with main container on the ground.

Lowering receptacles into the ground can put the deposit openings at a more usable height (Figure 6.4). They fit the urban context better and are more hygienic. One can easily equip them with electronic systems that can transmit a signal to the transport center when they are full and need emptying.

Figure 6.5. Accessible waste receptacles with main containers in shafts

This exemplifies universal design alternatives that exists, ready for use by municipal planners issuing guidelines.

Information and communications technology (ICT) has become a critical factor in society, not least in the context of democratic participation. Public information such as plans and political decisions need to be made available to the entire population. ICT can effectively convey information if its potential is properly used. One can incorporate tools such as artificial voices reading aloud the text of digital documents and the application of Web Accessibility Initiative (WAI) standards into municipal communication strategies, thereby increasing public accessibility to important information.

Cultural monuments are part of a common heritage, and need to be managed in a sound fashion. They need to be safeguarded for future generations, and should also be used to provide insight and experience to us today. These are complicated issues. As one expert in the government cultural heritage administration put it when he was trying to explain the overall lack of accessibility to cultural monuments for people with disabilities: "We don't believe that it is people with disabilities who pose a threat to cultural monuments; we believe that all people pose a threat to them." Nonetheless, it is necessary to work toward solutions that combine use and protection—utilization that includes people from all segments of society. Far to the north in Finnmark county, along the Alta Fjord bordering on the Barents Sea, is one of Northern Europe's largest fields of rock drawings, a UNESCO World Heritage Site, with 5,000 petroglyphs ranging in age from 2,000 to 6,200 years old. Due to wear and tear from the many visitors, the authorities considered closing the field to safeguard it for the future. Instead, the situation was resolved by building wooden bridges across the entire area. Here, new thinking both protected this important cultural monument, and made it possible for persons with disabilities to experience this spectacular rock art.

While this winning solution resulted more from coincidence than conscious analysis, similar success stories can become the norm, rather than the exception. To achieve this, we should base access to cultural monuments on universal design principles. One place to establish this as a necessary strategy is the community planning part of the municipal master plans.

Figure 6.6. Wooden bridge across the fields of rock drawings in Alta protects this cultural monument and expand access.

There are many more illustrations of important spheres of society in which one should analyze and incorporate considerations relating to people with disabilities into long-term, overall, and strategic plans. In Norway, these considerations are integrated into the community planning parts of the county and municipal master plans, which lay down guiding principles for the various sectors and determine the desired course of community development. Other realms also issue guidelines involving the application of universal design strategy to the various sectors. Various government regulations and political decisions, such as in ICT, protection of cultural monuments, education, building construction, specify this. The integration of universal design thinking in planning processes and in plans themselves lends weight to the policy and enhances coordination and consistency. Moreover, it ensures that such thinking becomes a necessary part of the political and administrative framework.

In political circles, Norway has experienced little disagreement on this development. The political parties from left to right support the policy actively. The political orientation of the cabinet has changed several times over the last few years, and each change of government has resulted in more emphasis on universal design policy.

Universal Design in Land-Use Policy

Land-use policy attempts to determine how land area is to be used through due democratic process. Municipal planning activities culminate in a plan that is legally binding. In practice, this entails a map of a municipality in which various colors are employed to indicate specific types of use. Other legally binding provisions may be issued regarding special considerations to be taken into account. These may involve requirements relating to the order of development activities, infrastructure, size and design of buildings and facilities, outdoor areas, and so on. Provisions may also be issued regarding the designation of a more detailed plan that stipulates other quality requirements. The Planning Act lays down the capacity to make such decisions, and here we can discern the contours of a legal instrument that one can use to deal with areas of importance in terms of accessibility for persons with reduced functionality. This applies to buildings, outdoor areas, and road systems.

The land-use categories in the municipal master plan are:

1. Built-up areas,
2. Agricultural, natural, and outdoor recreational areas,
3. Areas for resource extraction,
4. Closed areas (e.g., areas for military training, security zones around fixed cultural monuments, and natural areas),
5. Use and protection of watercourses and sea areas, and
6. Important links in the communications system.

Categories 1, 2, and 6 have the most relevant in the discussion here. They can have a direct impact on accessibility for persons with reduced functionality. Built-up areas, natural and outdoor recreation areas, and important links in the communications system have sub-categories that correspond to colors on the planning maps: Housing (yellow); industry, offices, and private businesses (blue); public activities (red); outdoor recreation areas and parks (green); water (light blue); and roads (grey). These maps, which decorate the walls of many planning agencies, document municipal development. The saying that, "If you don't have a plan for yourself, you'll be part of someone else's," applies in land-use planning like everywhere else. There are many interests at stake, some of which validate the principles of universal design, other that diverges from them.

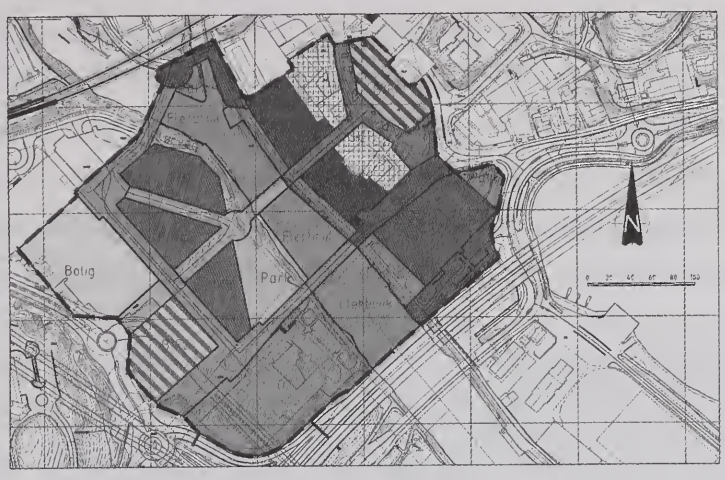


Figure 6.7. Part of planning map

"The fundamental factors for achieving universal design at this level of planning are walking distances, level of incline, and landmark orientation."

To achieve universal design at this level of planning, one must consider walking distances, levels of incline, and landmark orientation. Short distances are particularly important in residential areas. Long distances to grocery stores, post offices, and public services pose obstacles to daily life for many people, and these obstacles increase with age. Both urban structure and location of residential areas are important in this regard. If the main structure for development of a city or town is based on a division into zones—housing district in one area, business district in another, and, say, outdoor recreational areas in a third—this creates a structure without nuclei to offer a variety of services, increases the distance between areas of daily activity, and diminishes accessibility. Encouraging new development in existing nuclei, towns, and city areas strengthens the business base in existing centers and enhances available services. Cities in many Western countries have lost residents, businesses and still have poor traffic accessibility. Some countries have implemented policies in response. For example, Norway introduced a ban on the establishment of shopping malls outside of established urban centers to counteract these developments. Such policies have also sought reduce dependency on private automobiles, thus decreasing resource consumption. Existing urban centers often offer good collective transport coverage, with a choice of bus and subway instead of car.

Why, however, should we give such emphasis to the needs of persons with reduced functionality if other important societal considerations also point in the direction of concentrated development? There are several reasons. The needs of persons with reduced functionality represent a social issue on par with

other issues. Assessments should include universal design whether on its own or in conjunction with other social issues. Planning processes need to include universal design dimensions in plans that other societal considerations may overlook. This applies, among other things, to mandatory requirements for the design of buildings, facilities, and outdoor recreational areas used by the public at large on the basis of universal design principles. This may be formulated as a decision pursuant to the Norwegian Planning Act and manifested directly in the quality of the design details. These details may receive more substance in the more comprehensive zoning plan, which specify the height of curbstones, incline of pedestrian walkways, and guiding features for people who are blind and vision-impaired. It also specifies the quality of housing in a planning area and can stipulate any requirements that extend beyond the provisions of Norwegian building regulations. It may stipulate that all or part of the housing stock to be built in a given area must be accessible to and usable by persons with disabilities.

Most municipalities need to expand beyond the land available in existing cities and urban centers. Many people prefer to live outside cities, which entails readying new land area for housing, services, and employment. New development areas should be chosen to provide the highest degree of accessibility possible. They should be planned as urban centers with nuclei that can serve the local environment. In choosing between various development alternatives, one should select those that provide the best foundation for universal design solutions. This means avoiding areas with steep or hilly terrain that make road and pedestrian access difficult and inhibit accessibility to housing and other buildings. Norway has extreme topographical variation. Most of the available flatlands are protected farmland or are located high on mountain plateaus. This leaves limited choices of terrain for building housing. In Western Norway, known for its deep valleys and impressive fjords. surveys of residents living in mountainside areas indicate the ramifications of building along the steep inclines, away from the local urban centers. Many of the residents say that they could not live in these homes when they grow older. This is regrettable because it implies less choice for the individual. Herein lies a clear message to the public authorities. Home-based care is a key component of the Norwegian care service, and unneces-

sarily complicated housing conditions leads to greater demands on resources. Some cases have alternative development areas available and plans can use the terrain differently. The challenge lies in making these areas function optimally through deliberate placement of roads and housing lots. One can make housing adequately accessible even in steep or hilly terrain.

Figure 6.8. Residential area near the city of Drammen in Eastern Norway

The Implementation of Universal Design Strategy In Norwegian National Planning Policy

Elements of a planning policy including universal design principles were introduced in Norway in 1999 in circular T-5/99 Accessibility for all. For the most part, the planning guidelines discussed here come from this circular. It provided a body of experience that now forms the basis for revising national planning policy. The main conclusion is that accessibility in the form of universal design can be integrated into regional and local planning. Yet, the circular has not been granted the desired weight implied in national objectives. Efforts are underway to launch a variety of instruments to rectify this.

The Planning Act is being revised, and a political decision has already been taken to include the principle of universal design in the objects clause. Universal design strategy will thus become an objective on a par with sustainability and protection of cultural monuments. The new act will also probably strengthen the participation of interest groups for disabled persons in planning processes, as well as the application of plan-

ning provisions to achieve design for all.

In 2006, national policy guidelines for universal design in planning will be issued. They will stress many of the same factors described in the 1999 circular. National policy guidelines carry greater political authority than a government circular.

Other aspects of the legislation have already been activated. The government impact assessment regulations to the Planning Act have incorporated accessibility for individuals with reduced functionality into County master plans, the land-use part of the municipal master plans, and municipal master plans that specify areas for physical development. Zoning plans must have environmental impact assessment in relation to accessibility criteria if, for instance, such plans involve office and public buildings for general use that exceed 5,000 sq. m. The same goes for roads, railway lines, and public tram and underground lines for the carriage of persons, as well as in the context of relevant plans for the development of towns and urban centers. It assumes that an impact assessment will only be necessary if the effects of a plan will be significant.

The amended regulations make the planning program a compulsory instrument for promoting early-stage user participation in and clarification of key considerations affecting the planning efforts. Efforts to develop the planning program will comprise an arena in which important limits can be defined, thus making it possible to adapt planning activities to needs. In political discussions the planning program will provide a basis on which to define a political framework, thereby establishing essential conditions for the planning activities. The regulations clearly stipulate that impact on accessibility is one of the topics to be assessed.

The Next Steps

In the course of the next year, Norway will have an improved legal framework for integrating universal design into the planning of community and land-use master plans. It will be necessary to provide information on this to local planning authorities and private planning companies alike. The implementation of new directives also implies a need to enhance competence. However, we are aware that we will also face new and even more demanding challenges.

Norwegian legislation will employ the concept of universal

design based on a definition that resembles the definition used by the Center for Universal Design at the University of North Carolina. This definition is fitting, but the accompanying principles and guidelines do not provide good associations with the qualities we are seeking in land-use planning. Moreover, the concept of universal design is somewhat difficult to use in a legal context. It requires something virtually without limits. Looking at these problems, we believe we can find solutions. Should these issues be discussed at the international level. The concept of universal design with principles and guidelines is gaining in international status, and it seems wise to ensure that potential adjustments are coordinated.

The more we contemplate universal design, the clearer it becomes that this is both an independent ideology and a societal component that meshes with other essential societal considerations. Sustainable development is a chief objective, but it is not fully isolated from universal design. Universal design is an important say to achieve social sustainability in that it creates a framework for human rights, equity, and democratization. At the same time, it is an instrument for economic sustainability because it allows more people to function independently in society, to pursue education, and to take part in the workforce. These issues need to be examined more closely.

Landscape development and design stresses the importance of preserving and developing the natural and built landscape. In the context of the built landscape, this means developing a visual identity and aesthetic form. It means developing cities and towns in which people know where they are. We need more knowledge about what this implies for the ability of the orientation-impaired to find their way about. This is a field that is rooted in the visual world, but landscapes consist of sounds, smells, and other sensory input. We all lose out on something if assessments of how to design landscape overlook these elements.

Many interesting academic and political development trends emerging in this field, and the planning authorities in Norway will be following these closely. Much of the work indicates that universal design is possibly the most innovative and significant element to reach the planning sphere in the past several decades.

7

Research and Teaching Of Accessibility and Universal Design In Brazil: Hindrances and Challenges In a Developing Country

Cristiane Rose Duarte and Regina Cohen

Abstract

This paper deals with accessibility and universal design in Brazil. Most Brazilian cities have physical barriers that restrict movement of people. Although eliminating these barriers can increase opportunities for every citizen, we must also eliminate attitudinal barriers, which because of their invisibility may be harder to fix. Until recently, Brazil has lacked information and awareness about the importance of these issues to urban planning and public policies. Architects, engineers, urban planners, professionals, technicians and the public share responsibility. Facing the challenge of improving access to urban space, the architects and authors of this paper created the Núcleo Proacesso (Accessibility Research Bureau, ARB) in 1999, linking it to a line of research in the Post-graduate Studies Program in Architecture (PROARQ) in the Federal University of Rio de Janeiro (UFRJ). Through targeting design professionals, ARB research—coordinated by the authors—has produced reports aimed at creating more accessible spaces for everyone. This chapter discusses our educational experiences, research projects, and the Brazilian reality. The undergraduate curriculum uses dynamic methods covering theory, simulation and intense design activity to motivate students to consider human diversity, accessibility, and the "Other" as key design concerns. The Post-graduate curriculum adds evaluation techniques and analyses. The 'new minds' shaped by our program target the effective change in a developing country, such as Brazil.

The 2000 Census in Brazil (Brazilian Institute of Geography and Statistics, IBGE, 2000) show that almost 24. 5 million people (14.5% percent of the population) have some kind of disability. These people have at least some difficulty related to seeing, hearing, moving around, or mentally understanding the world. Most of them do not receive support from urban spaces, which often block their free movement. Such barriers

exist for many reasons. We need better information and awareness about access as a civil right for every citizen.

The Federal Government of Brazil recently approved Edict n. 5.296 which regulates the implementation of architectural and urban accessibility to all means of transportation, public spaces, technical assistance, cultural heritage, information and communication. It affirms that the various documents of our urban legislation have to follow every standard and precept of accessibility (EDICT N. 5.296/2004). In Brazil, the deficiency usually relates to social and economical matters and the difficulty of moving on physical spaces in the city. Nevertheless, the recent Constitution of Brazil (1989) is one of the most advanced documents in the world, in guaranteeing civil rights and national protective laws. However, this great accomplishment is seldom followed.

In Brazil, the deficiency usually relates to social and economical matters as well as the difficulty of moving on physical spaces in the city.

Recently, the Brazilian Federation emphasized urban planning for those people considered "pattern"—the average ordinary person—Brazil started watching for a special treatment offered to People with Mobility Difficulty (PMD). Many charitable and philanthropic institutions appeared, but we would hardly ever see a global project towards the equalizing of opportunities for all. This attitude has enabled some social deviations such as the exploitation of deficiency as a tool for butting in, still common in our cities.

Some quick changes have occurred, but for such a large country, these represent small changes. Slowly, other changes have occurred, starting to create a new urban reality, eliminating inequalities in the fulfillment of accessibility.

In 1994, the first greatest International Seminar on Accessibility, in Rio de Janeiro, effectively started spreading the discussion of the theme, and a new version of the Brazilian Accessibility Technical Rules, last edited in 1989, was published. 2003 saw the creation of the Ministry of Cities and the Program "Accessible Brazil" in the Chancery of Transportation and Urban Mobility, aiming at enhancing with practical tools in accessibility and universal design. In 2004, the new version of the Technical Rules and the association of two federal laws became the most comprehensive document regarding accessibility.

In 2004, Adaptive Environments, a North American institution based in Boston, organized one of the biggest Confer-

ence on Accessibility and Universal Design, the event Designing for the 21st Century, which stimulated the discussion of this theme in our urban national scenario. The atmosphere enraptured Brazilian planners, who received much relevant information for use in every sector of design and planning.

Accessing places in a city presupposes an effort in urban design to reach everyone's spatial needs. With the aid of these conferences, Brazilian researchers found solid arguments to justify their plans, now strengthened by other countries which gave priority to the inclusion of PMD in their own cities. From this starting point, the concept of universal design started being associated with some urban interventions. Yet, the sense of legality and technical rules cannot sustain themselves alone. We believe that undergraduate courses represented a way to put ideas into action. They can play a crucial role in creating new ways of thinking, which conferences can spread.

We invest in architecture students in our university but here is still a long way to go.

Thus, our Research Group, Nucleo Pro-acesso, sought the improvement of academic skills in accessibility and universal design in architecture through a specific course created for undergraduate students. Our projects and work have influenced other universities.

This chapter describes the teaching approach. We invest in architecture students in our university but there is still a long way to go. As Brazilian architects, professors and researchers at UFRJ we decided to count on young students, open to new ideas and potential generators of opinion, as they can make the seeds of sustainability grow, searching for the promotion of quality of life, assuring future generations to reach the balance between society and environment and promoting the social-spatial integration of the differences.

This chapter first discusses the inclusion of people with disability in undergraduate courses and the access to university physical spaces in one of the biggest federal institutions in Brazil: UFRJ.

Disabled People in Brazilian Universities

People with disabilities in Brazil have long been excluded from academic life. Until the beginning of the 80's, there were many reasons that have kept them apart. The Philosophy of Special Education had been generally associated with segregation. The International Year of Disabled People declared by United Na-

tions in 1981 led to some changes in accessibility for Brazilian PMD in the undergraduate courses. Individual and collective efforts produced changes in university curricula, but students still had problems moving in spaces. In 1999, Decree n. 1679 of the Ministry of Education established requirements for access of people with disability in academic institutions. In 2001, UFRJ with the aid of Nucleo Pro-acesso and the University of Rio (UNIRIO) organized the First Forum for Special Education and Universal Design. Five years after Decree n. 1679, most Brazilian universities still lack basic accessibility.

Yet, some innovative attitudes toward spatial inclusion have occurred. For example, the National University of Brasilia (UnB) has implemented a program for supporting PMD and eliminating architectural barriers; the University of São Paulo (USP) started intervention proposals in their campy and a master plan for the implementation of accessible policies; and the University of Campinas (UNICAMP) inaugurated informational accessible spaces and a Didactic Lab with equipment for people who are blind, attending the internal and external community.

UFRJ with the work of its institutional Computer Bureau, Professor Antonio Borges developed a free software titled DOSVOX which works through a voice synthesizer to allow people with visual disability to access digital information. Borges has recently developed MOTRIX which allows people with motor difficulties to work with electronic devices.

At UFRJ, the authors of this chapter started the Research Group on Accessibility and Universal Design, (Accessibility Research Bureau, ARB) linked to the Faculty of Architecture and Urbanism. We also teach in the area.

Núcleo Pro-Acesso (Pro-Access Research Group)

Taking into consideration the present social situation in Brazil and the lack of accessibility in universities and schools of architecture, in 1999 we created a Research, Teaching and Design Bureau Group on Accessibility and Universal Design – Nucleo Pro-acesso – in UFRJ (Accessibility Research Bureau, ARB), linking itself to a field of research in the Post-grad Studies Program in Architecture (PROARQ).

Through a specific approach in architecture and urban design, our group has produced strategies for the creation of

accessible spaces for all, and we have an effective participation in many different sectors through the work of architects coordinated by us. This group has been a pioneer in Rio de Janeiro and the country. As educators we emphasize the necessity of amplifying the didactic activities for a critical reflection, making students analyze, understand the construction of models and decide what to adapt.

Based on this approach, the chapter discusses the ways we make future architects aware of sensitive to PMDs. Our activities towards accessibility began with the first research in the circuit of post-grad courses considered "open" sectors in the development of quality of life ideas. The activities in the Bureau have diversified, gathering from the elaboration of readjustment plans to historical buildings to the representation of the university in permanent commissions of accessibility, and developing teaching, research and extension activities.

We thought it most important to sensitize students at the School of Architecture to this matter, as they will become the planners of tomorrow cities. We involve them in developing plans and projects, closely followed by students in the post-grad courses. ARB had the following objectives:

- Promote the reflection over the quality of life of the built space for all;
- Sensitize undergraduate and post-grad students for the architectural and environmental implications of design studios headed for social groups with special necessities;
- Produce and gather special material in this theme;
- Support architecture plans for active participation of users with disabilities in the city spaces;
- Promote seminars and meetings for discussions over accessibility and universal design;
- Establish exchanges with national and international entities for specific public policies;
- Spread the results of research and studies developed by ARB or other institutions;
- Advise local community in topics related to accessibility and universal design;
- Demonstrate that inclusion and exemplary design are compatible.

ARB has acted on diverse academic activities, and has counseled on the elimination of accessible barriers in both

public and private institutions (e.g. universities, banks, shopping centers); offering courses for professors, technicians and urban planners; guiding Final Studio Projects in undergraduate and post-grad courses related to accessibility.

Products of ARB have received recognition in the international scientific community, institutional and financial support, and awards. Consider some of what ARB has accomplished, and what challenges lay ahead.

Research Activities

ARB has worked to improve scientific methods and knowledge about accessibility and universal design. We conducted the first relevant and widest conceptual, physical and iconographic survey in Brazil. The dissemination of those results gained national attention and use by other universities, institutions and city, state and federal government bodies.

Conceptual Bases

Our research focuses on the environmental experience of users and social sustainability. Toward this end, we based our research on seven concepts:

- Environmental experience
- Social sustainability
- Access and accessibility
- Universal design
- Accessible route
- Spatial exclusion
- Disadvantage

Environmental Experience. This analysis centers on the multiple forms of perception one may have towards urban spaces, and to attributes that act on different kinds of affective experience in spaces. Space experience structures every person's identification standards with environment. For Tuan (1983, p. 10) "experiencing is learning, understanding; it means it is possible to act on space and create from it." We have verified that the impossibility of experiencing spaces in the same way as every day users is a barrier itself; and this experiential barrier is often larger than other physical barriers in urban spaces. Evaluative responses to places allow people to become identified with spaces and this occurs through space experience. We have been working on this spatial notion of affording differ-

ent ways of apprehension and possibilities for PMD to identify themselves with the places they act on.

Social Sustainability. This analysis deals with the possibility of access as an essential aspect of the quality of life of citizens. We consider Social Sustainability as an improvement on the quality of life of populations and promoter of Social Inclusion. We understand the importance of sponsoring the participation of spatially excluded groups in the use of public elements of cities. If self-sustainable development presupposes an integration of economic and social development with environment, as many theoreticians advocate, then studies on sustainability should include the search for spatial inclusion strategies.

Access and Accessibility. Lynch (1990) saw Access as one of the elements to achieve 'the good form of the city'; Françoise Choay and Pierre Merlin (1988) gives a wider and more holistic view of Accessibility in the 'Dictionary of Urbanism' as do the works of Mettetal-Dulard (1994) and Guimarães (1991). The concept of Accessibility brings the idea of 'everybody's possibility to access.' In this way, we include people with any kind of difficulty: older adults; people with reduced mobility; people with low vision; people with neurological, sensorial or physical disability; people who are obese; people of short stature; children; women who are pregnant, and so forth.

Accessibility, according to Brazilian Technical Rules presupposes the "possibility and condition to safely and autonomously use buildings, spaces and urban equipment" (NBR 9050, ABNT, 2004). Thus, accessibility to built spaces is more than measures for people with any kind of disability, which may increase spatial exclusion and separate people. Instead, it should encompass social-technical standards to support every potential user (Duarte and Cohen, 2004).

Universal Design. The concept of universal design, according to Preiser and Ostroff (2001), was first used by Ron Mace in 1985, and the term has become widespread. Now many environmental design professionals and planners have adopted the concept of accessibility and terminologies such as "Inclusive Architecture" and "Inclusive Design." These terms have evolved into the broader concept and philosophy of "Universal Design." It brings the idea of products, spaces, furniture and equipment designed for a larger number of users and represents a positive view towards accessibility. It goes beyond architec-

tural objects to physical, cultural, social or other exclusions. Thus, universal design requires more than simply eliminating urban barriers. We must think of inclusive space as that which allows people to fully experience spaces.

Accessible Route. "Accessible Route" consists of a barrier-free route from origin to destination. It involves a continuity and includes accessibility measurements. Thus, for example, the existence of ramps or a public counter with appropriate height does not insure accessibility if a narrow door blocks the route. "Accessible Routes" are essential to the assessment and classification of spaces as Inclusive Spaces.

Spatial Exclusion. The concept of "Spatial Exclusion" developed by Duarte and Cohen (1995) considers space as an actor that deals with users in the sense of excluding or including them in spatial interfaces. Spatial Exclusion occurs whenever spaces segregate actions or objects to lower importance. This becomes the materialization of social exclusion. Inaccessible spaces then act as silencing apartheids that consequently generate the segregation of PMDs. As far as PMD are kept apart from places in the city, because they cannot use them, they face concrete and evident differences from others. This situation may lead some people to feel like part of a minority group, which may contribute to social exclusion and segregation. Thus, even if society speaks of "social inclusion," spatial exclusion" may refute the words. Spatial exclusion becomes social exclusion.

Many kinds of barriers may disrupt access and social contacts. The ability of developing affect for places depends on the level of receptiveness those places offer people. An example relates to older adults and the difficulty and exhaustion they find sometimes in getting around. Feeling tired interferes with their enjoyment of places, and can further exacerbate their social and spatial exclusion and segregation. Some persons with visual disability may fear some urban equipment lacking signalization and that fear may lead them to avoid places, thus socially excluding them.

Disadvantage. We teach our students to dialectally explore disability. If we understand that every person should have the opportunity of experiencing the same places, then the concept of disability does not embrace whatever we want. Thus, we chose to use the concept "Disadvantage." Disadvantage re-

sults from an incompatibility between the individual's physical and intellectual characteristics and environmental conditions; something that places one in an unfavorable condition or circumstance. For example, if people live in a hilly place and want to get downtown faster, they live in an unfavorable condition compared to those who live midtown. Hence, we must see disability as a contextual situation rather than an unsolvable problem. This concept helps us understand that space itself is disabled. Many limitations of PMD result from deficiencies of spaces rather than a lack of ability the potential user.

Research Developed by Núcleo Pro-Acesso (Accessibility Research Bureau, ARB)

Taking into consideration the knowledge acquired in many years of research, we have started to advise dissertations and thesis in the Post grad Studies Program at UFRJ and other universities gathering a larger group in the discussion of planning 'for all.' From our work, we discovered the need for a specific methodology to investigate different spaces, and have developed studies and methodological resources to assess places including:

- Accessibility to Academic Spaces of Teaching and Research
- Accessibility to Public Spaces
- Accessibility to Schools
- Other Research and Post-grad thesis

Although the studies identified an enormous number of barriers, this chapter highlights some common difficulties that the research projects discovered. With the results, we could develop audit charts to check the complete accessibility of an urban or architectural space and to allow plans to eliminate the barriers found. The absence of an accessible route suggest a fragmented awareness which leaves these spaces unusable by PMDs. Some of the adaptations done take into consideration parts of the building (such as a bathroom or a classroom), a sidewalk or the transport, but plans and designs lack a global accessibility project and universal design.

Accessibility to Academic Spaces of Teaching and Research. One research project developed with the support of the State Government of Rio de Janeiro, aimed at assessing the accessibility of PMD to universities in Rio de Janeiro. We hoped

to benefit the quality of academic life of those people in every teaching and research spaces. We focused on some spaces of UFRJ

Figure 7.1 School of Education with many accessibility barriers, UFRJ

Figure 7.2. School of Literature with bad pavement, UFRJ

Our field research findings contributed to the perception and better evaluation of the situation in UFRJ related to accessible spaces. They have also demonstrated the influence of physical environment in the construction of a specific social identity for PMD who are differentiated by the level of access each space offers.

Two years after the research, our Accessibility Research Bureau with the support of the Rectory began to gradually eliminate the barriers (a Strategic Plan). This initiative influenced other universities in the country to follow suit.

Accessibility to Public Spaces. This project sought to create strategies for the improving access to built spaces, contributing to a change in Architecture and Urbanism posture - as fundamental to the construction of identities. Our survey on Accessibility in Public Spaces focused on the interaction of requirements given by differences. To analyze the structure of public spaces we sought Public buildings open to a diversified group of the population; buildings showing symbolic values according to many citizens; buildings located in areas of easy and successful study of the surroundings, public transportation, parking areas and crossways–taking into consideration access ways and contemplation areas; and the absence of bureaucratic hindrances for our researchers.

Based on that, we selected three public buildings for our field-research: (1) the Municipal Council of Assemblymen of Rio de Janeiro; (2) the School of Application of UFRJ (CApU-FRJ); and (3) the Ministry of Education building. We identified the accessibility barriers found by PMD in the routes and everyday activities in these buildings and their surroundings. Considering movement from the interior to the nearest points of access to transport and the sidewalks of each place, we found that for each building people neede help to walk around.

Figure 7.3. Route of great flow of people on the sidewalks fully supplied with garbage cans, ice-cream carts and street vendors in front of the Municipal Council of Assemblymen of RJ.

Figure 7.4. Ministry of Education building: Inappropriate pavement for people on wheelchairs.

The barriers should not be seen as local or only in some parts of the building. The research led us to see the importance of proposing a strong and effective global planning towards buildings and surroundings to accomplish the concept of "Accessible Route."

Accessibility to Schools. Sponsored by The State Government of Rio de Janeiro, this project searched for strategies to include children with disabilities in public educational spaces (called "fundamental schools" in Brazil). The choice of educational places arose from our conviction that architecture must make spaces with free access to all educational sectors.

The research showed the importance of a truly inclusive architecture for the realization of the social function of public schools. We developed a method for assessing educational spaces and indicators for use by all educational sectors in the State Government to improve future plans of schools.

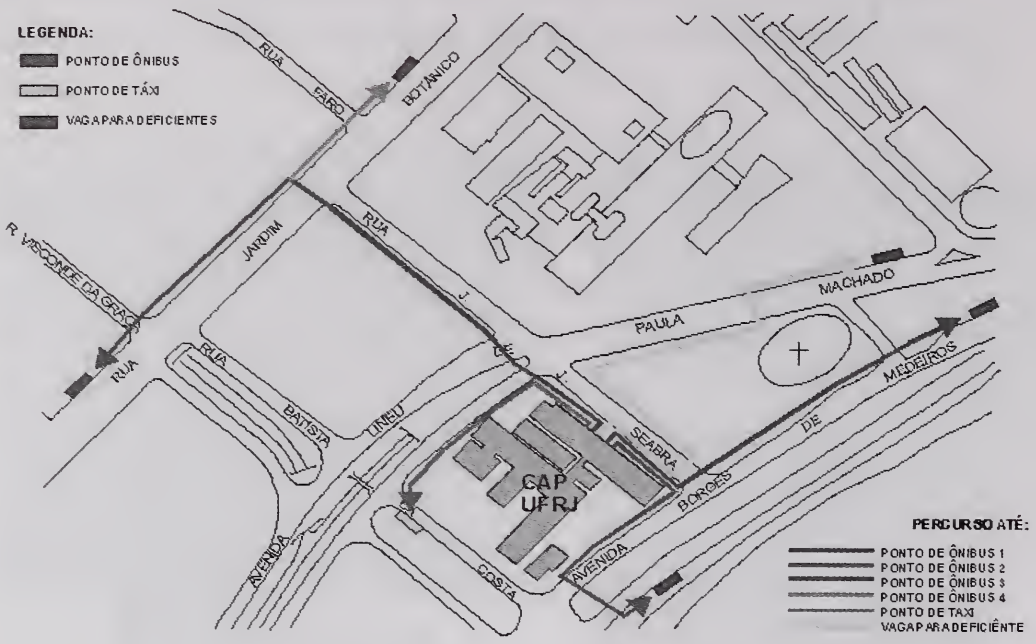


Figure 7.5. Map – Accessibility to the School of Application of UFRJ (CApUFRJ) – Surroundings

Figure 7.6. Bad sidewalks with exposed tree roots in front of CapUFRJ building (left); parking blockers at bus stop used by kids of CapUFRJ (center); Narrow sidewalks width of 45 cm in some sections (right).

With the findings we could develop tools for assessing accessibility. ARB has begun to work with architects to put ideas, theories and research into practice and to transform the discourse into the reality of public, academic and educational spaces accessible for all.

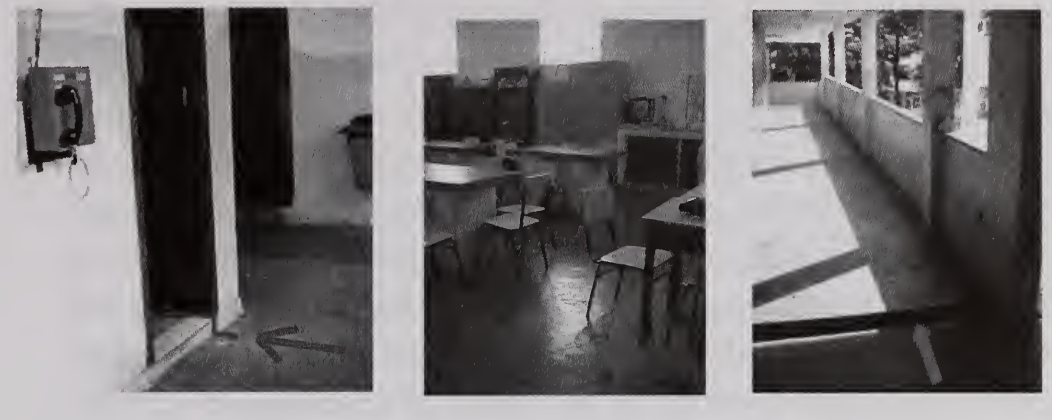


Figure 7.7. Unevenness classroom doors and the existence of objects stuck to walls without any information on the floor (left); labs with fixed tables blocking wheelchairs (center); a ramp ending at a step (right).

Other Research and Post-grad thesis. Our first research and the operational life of ARB has stimulated the interest from institutional groups linked to UFRJ as well as students in the undergraduate and post-grad courses. Now our Research Group works to attract interested researchers in developing work on accessibility issues. Some of these include:

- "Environmental Accessibility: From legal disposals to the inclusion of PMD" (Fernandino, 2006). This dissertation analyses some buildings constructed under the regency of Brazilian accessibility laws and finds that these laws/rules are not enough to create spaces completely agreeable.
- "City, Body and Disability: Possible routes and speeches in urban experience" (Cohen, 2006). This thesis outlined the use and appropriation of spaces according to the locomotion PMD perform. We sought to develop an interdisciplinary approach of the perception in movement and to take into consideration the inter-sensorial dimension of the urban experience. For our investigation we have adopted Jean-Paul Thibaud's "method of annotated routes," in which local characteristics are analyzed, mostly, in terms of physical barriers to perception. He understands 'perceiving' as an embodiment of sensorial elements affected by the type of perceptive mobilization. The analysis of the urban perception in movement of PMD was conducted in four Brazilian cities: Rio de Janeiro, Salvador, Juiz de Fora and Brasília. The data revealed the existing paradox between the perceived, experienced and imagined cities for people. The lack of identification PMD have

with the places also showed that they cannot improve their sense of belonging and appropriation of the city.

- "Socio-spatial Inclusions of children with Special Needs through Rides in Public Plazas" (Carvalho, 2005). This dissertation explored some ergonomics parameters for children between 5 and 12 years-old relating to the parameters with some difficulties generated by physical disability. The dissertation found that: play has the function of integrating children with cognitive disabilities; it allows the conquest of spatiality, enabling children with cognitive disabilities know their bodies better and develop notions of balance witch increase their self-esteem and emotional stability; and in public plazas it allows socio-cultural exchanges between families. This study opened ways for establishing guidelines for the project of "Children' Rides." The guidelines include:
  - Safety: handrail, bars, alert pavements, resistant materials, protection of the plays with signalization.
  - Accessibility: eliminate barriers, drops, compatible width for wheelchairs, and care with circulation.
  - Motors and Intellectuals Stimulus: climb, hang, run, dig, hide, feel different textures, live physical sensations, win defiance, respect the other, share, memory games. (See Rides for Children with Cognitive Disabilities).
- "Architecture beyond Vision: A consideration over the experience in built environment from the perception of congenital blind people" (Paula, 2003). This dissertation started from posed the question "what is a good architecture for a person who is blind?" It answered by establishing, based on perceptual and cognitive processes, several properties desirable for architectural spaces. The research hypothesized that architecture has ignored different characteristics for a ordinary users in the surrounding environment. With the analysis of environmental perceptions of people who are blind, the research also showed that the experience of the architectural space can become richer, more intense and connected to all of the senses, and that vision can deceive people leaving them with an ambiguous understanding of the environment. The dissertation showed that through an intentional plan, one can emphasize other senses, giving people a richer environmental experience of a space. The conclusions of this work confirmed Merleau-Ponty's (1989) statement that, "space is not object of

vision but of thinking."

Academic research developed by ARB itself: "Accessibility, Identity and Quotidian Life of Citizens with Mobility Difficulty: case-study of Rio-Cidade" (Cohen, 1999) analyzed urban interventions promoted by selected urbanists in Rio de Janeiro during the administration of 1999 Municipal Government. This master dissertation on urbanism raised questions related to barriers of accessibility found in the city of Rio de Janeiro. Cohen sent questionnaires to 300 people with some mobility difficulty. The field research concentrated in the main axes of the districts remodeled by the "Rio-City Project." The

Figure 7.8. Ramps in the main axe of the district of Ipanema—Rio-City Project

analysis allowed an evaluation of this urban intervention, the context in which the project was discussed, and the technical solutions. She found that the Program satisfied most of PMD who reported that everyday life became better, but some of them (16 percent) indicated some dissatisfaction with the degree to which it met their necessities.

Tools for Assessing Accessibility

ARB also developed and refined analysis tools including:

- Analysis and Description of Routes Chart (Cohen and Duarte, 2006)
- Accessibility Assessment Chart (based on Guimarães and Fernandinho, 2001)
- Video Registration and Field Notes of Routes (Cohen, 2006)
- Analysis and Description of Route Chart

We developed an efficient tool for surveying routes. In

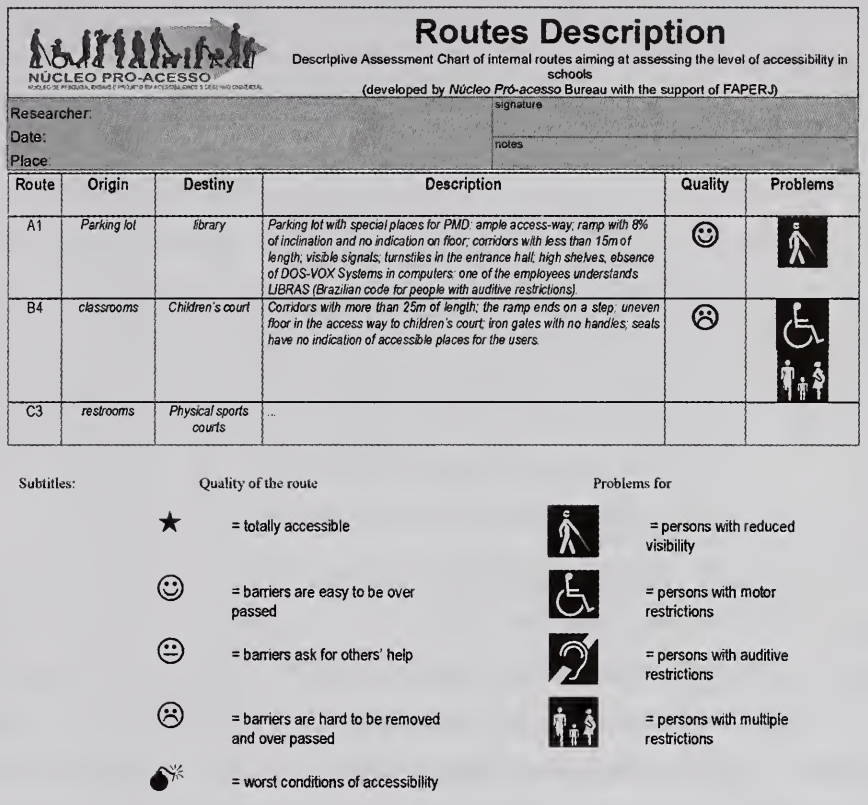
the 'Description of Routes Chart' we select some simple routes which are further described for the best verification of accessible routes. We numbered the routes so they can be followed in schematic maps (building plans). One can use this to highlight the real situation of specific routes used by people. Sometimes we find places of easy access but not relevant if analyzed though the holistic concept of "Accessible Route" described in the sections which follow.

Accessibility Assessment Chart. Based on the criteria established for the Accessibility Assessment Chart (Guimarães e Fernandino, 2001), we adapted this tool for the needs of the research. We have used these charts to our surveys in schools, academic institutions, tourist places and some others.

The assessment charts indicate, in the first column, the number of the registered item in order to ease its identification in future references; in the second column, the specific legislation of the analyzed topic (rules, laws or recommendations); in the fourth column, the "dimension" of the barrier (E=demands elimination–access is not possible; R= recommendations – only with help access is possible; P=access is possible); in the fifth column, whether the item is accessible (yes / no); in the sixth column, space for a photographic reference to illustrate the space or the element selected; and in the last column, space for observers to write personal comments.

Video Registration and Field Notes of Routes. Based on the ethnométodologie (Thibaud, 2001), we tried to improve tools for collecting fundamental data about the barriers found, what they represent to the PMD's quality of life and to understand accessibility matters in their everyday activities. Filming of routes through the analyzed spaces allowed us to study the apprehension, cognition, and behavior in relation to the environment. We worked on the strengthening techniques that deal with ethnographic data collection (films and photographs). Filming proved to be an efficient tool for capturing the richness of individual and collective experience of humans in space as it preserves the original phenomena which is sometimes difficult to observe and record directly. We used digital video-cameras and a paper notebook for field notes and sketches. The paper notebook lets observers register graphic notations, relevant data and small schemes of the environment that caught their attention during observation period, composing what Cosnier

(2001) qualifies as "descriptive study of site.



NÚCLEO PRO-ACESSO

Routes Description

Descriptive Assessment Chart of internal routes aiming at assessing the level of accessibility in schools
(developed by *Núcleo Pró-acesso* Bureau with the support of FAPERJ)

Researcher: signature
Date: notes
Place:

Route	Origin	Destiny	Description	Quality	Problems
A1	*Parking lot*	*library*	*Parking lot with special places for PMD; ample access-way; ramp with 8% of inclination and no indication on floor; corridors with less than 15m of length; visible signals; turnstiles in the entrance hall; high shelves, absence of DOS-VOX Systems in computers: one of the employees understands LIBRAS (Brazilian code for people with auditive restrictions).*	☺	
B4	*classrooms*	*Children's court*	*Corridors with more than 25m of length; the ramp ends on a step; uneven floor in the access way to children's court; iron gates with no handles; seats have no indication of accessible places for the users.*	☹	
C3	*restrooms*	*Physical sports courts*	...		

Subtitles:

Quality of the route

★ = totally accessible

☺ = barriers are easy to be over passed

😐 = barriers ask for others' help

☹ = barriers are hard to be removed and over passed

= worst conditions of accessibility

Problems for

= persons with reduced visibility

= persons with motor restrictions

= persons with auditive restrictions

= persons with multiple restrictions

Figure 7.9. An example of Descriptive Routes Chart. It is usual to apply seven charts of this kind in a single building, describing, at least, three selected routes.

Outreach Activities

In Núcleo Pro-acesso (Accessibility Research Bureau, ARB) we had the opportunity of working on many outreach or service-learning projects. This chapter presents two of them:

- Accessibility Guide-book;
- Games for All

Accessibility Guidebook

Our proposal towards a specific methodology for the making of an Accessibility Guidebook, aimed to offer key information on good quality of accessibility to the city and to include Rio de Janeiro in the context of world tourist accessible cities. This proposal came from our efforts on research and cataloguing since 1999 and aims to widen the information about accessibility. To analyze and estimate inclusive spaces in the city, we sought to understand the difficult interfaces between accessibility places in many cities. The steps of work include cata-

NÚCLEO PRO-ACESSO

Library / Media Centers

Accessibility Assessment chart - Libraries and Media Centers
(developed by *Núcleo Pro-acesso* Bureau based on Guimarães & Fernandino's, 2001)

Researcher: signature
Date: notes
Place:

N.	Legislation		Exc. Reg. Lack	Accessibility queries	In compliance with?		N. of pic.	notes
	Regime /Rule	Item / article			Yes	No		
2	9050-04	8.7.2	R	Is there a percentage of 10% adapted tables for PMD?				
3	9050-94	6.2.2	E	Is there a minimum round area of 1,76m² in the library for a complete 360° turn of a wheelchair?				
4	9050-94	6.2.1	R	Is there a minimun width of 90cm for the passage of a person on a wheelchair between book shelves?				
6	9050-04	9.5.2.1	E	Does the counter/reception desk have a maximum 90cm height and minimun 90cm length of surface?				
7	9050-04	9.5.2.2	E	Does the counter/reception desk have a minimum open inferior height of 73cm from the floor in order to ease frontal approximation?				
15	9050-04	7.4.2	E	Is the height of shelves between 40cm and 120cm from the floor?				
20	N.Pró-acesso		R	Is there any information regarding alert-pavement next to shelves or other obstacles?				
21	N.Pró-acesso		R	Is there sufficient lillumination of surfaces (more than 200 lux) so as to allow labial-readings?				
22	N.Pró-acesso		R	Do computers have voice synthesizer systems? (E.g. Dosvox – created by The Federal University of Rio de Janeiro)				
23	N.Pró-acesso		R	Are there digital samples of books and papers?				
24	N.Pró-acesso		R	Are indicated titles and themes on shelves written in caps or visible formats?				
25	N.Pró-acesso		R	Are there Braille indications in bibliographic records?				
27	9050-04	5.7	E	Is sound signalling associated to visual signs and signals?				
41	11.666 -1994	3°	E	Do doors have minimum spans of 90cm?				

Figure 7.10. Demonstrative chart. In this example, for a better understanding, some assessment items were ignored (The original has up to 46 elements).

loguing, analyzing and making the Guidebook, giving special attention to physical, historical and artistic/cultural heritage of the city, in the attempt of stimulating the participation of PMD in the cultural production of places.

To guide their assessment of accessible places in the city, and to enable the making of similar Guidebook in many cities, we gave professionals an extensive set of lectures.

The steps for making the Accessibility Guidebook include:

- Recruitment of the team and job assignment;
- Theoretical-conceptual equalizing on the matter of accessibility and on the technical aspects;
- Selection of the items to research and detail;
- Contact with institutions that work with PMD to complement the selected research items;
- Contact with institutions of culture, leisure, tourism

and services to complement the list;

- Scanning and planning field research logbook;
- Field research of the barriers found in the space and the level of accessibility of that place;
- Data collection and analysis
- Final layout.

Moreover, the assessment of accessibility conditions of some places and tourist attractions will be done through a pre-established check-list, guided by a previous survey with items on specific issues related to the city of Rio de Janeiro to complement the information supplied by the Guidebook. This phase derives from the concept of Accessible Route that guides the classification of inclusive tourist spots.

Other phases of the Guidebook refer to compiling collected field-data and transcription into text and symbol format; elaborating maps and plans; preparation of a list of photographs to include; photographing; selection of photographs, maps, plans and drawings to include; revising the whole texts; transcription into Braille; visual programming, formatting and final art; photolites; and preparation of useful data for future versions in English and Spanish, as well as into CD-ROM version.

Figure 7.11. Photoshop handling of a desired situation (still impossible to come true): a PMD enjoying the wonderful scenery of the 'Sugar Loaf'/RJ (photo by Cristiane Duarte; source: Núcleo Pro-acesso)

The information displayed on the Guide-book, with the aid of good layout, aims at easing the use of it by older people or people who have reduced mobility with hands. This approach supports the premise of creating a clear, updated guidebook easy for anyone to use.

Figure 7.12. Older people have difficulty in going downstairs Museu da República, Rio de Janeiro (Source: Núcleo Pro-acesso)

In this way, we created the mock-up of a 4.2" x 8.27" format which allows the easy handling by people with motor disabilities and by people who wish (and need) to hold the guide-book in one hand and have a magnifying glass in the other. We concluded that these dimensions would benefit both size and illustrations lay out.

Besides illustrations and photographs, the use of maps will be constant in order to indicate the accessible and partially-accessible routes in the surroundings of the listed attractions.

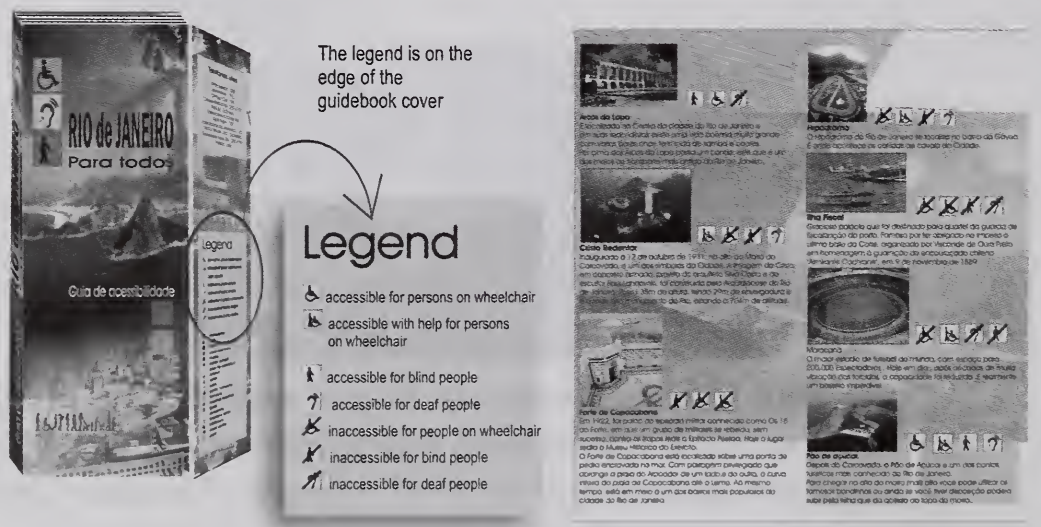


Figure 7.13a (left). Experimental guide-book: The cover unfolds and shows an internal detachable flap where one may find the main captions with the adopted symbols (Source: Núcleo Pro-acesso)
Figure 7.13b (right). Samples of informational pages classified by accessibility levels (Source: Núcleo Pro-acesso)

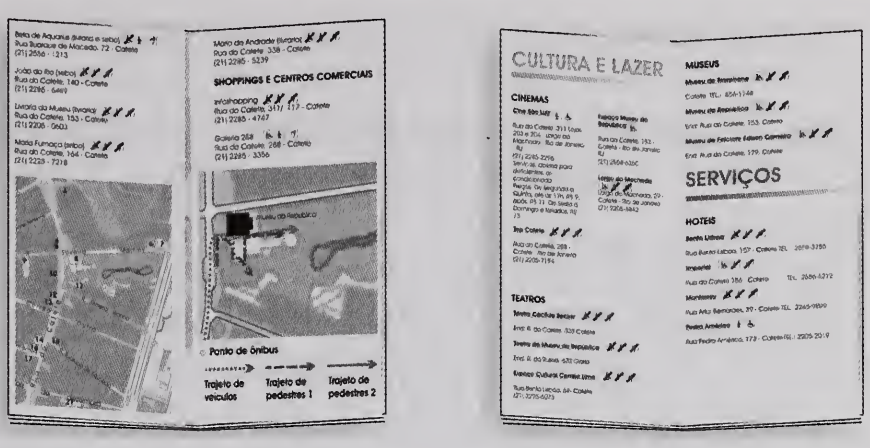


Figure 7.13. Samples of pages giving information about Catete (zoning area) and access to Museu da República (copyright Núcleo Pro-acesso)

This will add extra relevance to information offered in the texts that refer to each attraction, tourist spot or service. The Guide-book will come with a CD ROM sample, followed by a DOSVOX software for computer downloading.

Rides for Children with Cognitive Disabilities

The study and elaboration of accessible rides prototypes for Children with Cognitive Disabilities (CCD) was another outreach project developed out of several such projects we did with the partnership of the Environment Municipal Office and the City Hall Department of Parks and Gardens in Rio de Janeiro. Although, due to political constraints, we could not complete this project as we had intended, we did gather much information and developed drawings and sketches to test these rides.

CCD differ in their ability to develop the physical, mental and sensorial aptitudes. They have the same dream of using areas of plazas and parks in the city, playing with the other kids, and feeling as if they are one of them. We observed that they usually have no prejudice against other children and naturally behave with differences. Then, we realized that the encouragement to socialize with various children's groups in public areas of the city can reduce the level of prejudice and culturally/socially including CCD in the process of socialization – usually common for those with no restrictions and/or limitations.

This project arose from the three principles: 1) Children's games work as integration elements among children. 2) Rides

allow spatial conquest and make children with cognitive disabilities understand their bodies and gain notions of balance and harmony, which enhances their self-esteem and emotional integrity. 3) Rides in public plazas allow children to interact with their families.

The beneficiaries of this project are not only children with some physical, mental or sensorial disability and their families, but also society. We outline the importance of user participation and interaction in the planning of design guidelines. In general, the experience of differences enables the enrichment of social interactions and generates new ways for experiencing citizenship.

We first contacted people of national and international institutions that have already developed analogous works; then, we set out parameters for each area of disability, according to statements of those children with special needs. With the data we have collected we believe we can reach our goal of 1) building a prototype ride that is to be used by every single child, and 2) conducting a pilot project of a totally accessible

Figure 7.14. Samples of accessible rides prototypes for Children with Special Needs (CCD).

plaza, which takes into consideration the different necessities, wishes and aptitudes developed by children according to the principles of diversity widely spread, but rather contemplated by society.

The project "children's rides for those with special needs" may be considered pioneer in this thematic area, stimulating the diffusion and adoption of similar rules in other areas of the city of Rio de Janeiro and some other places in Brazil, showing

that "it is possible to shelter differences when playing."

The Teaching of Accessibility and Universal Design in the Undergraduate Course of Architecture

Our teaching experiences in the undergraduate course of Architecture and Urbanism started with workshops and technical advice to the development of academic works in disciplines of design. We realized that these activities were not efficient for the students to understand the real dimension of the social, cultural and behavioral factors related to the design for people with disabilities.

The students still considered accessibility as a mere question of technical dimensioning to respond for "another rule that inhibits freedom in design," as if it were a guidebook for construction. Thus, four years ago, we decided to institute a specific discipline "Inclusive Methods and Techniques for Design" related to Accessibility and Universal Design in the scope of the curriculum of Architecture course at UFRJ. The course lasts one-semester with one four-hour class every week. To avoid students' lack of motivation to finish the studies, maintain the needed enthusiasm, and achieve a productive teaching-learning process we formulated a dynamic method which mixed theory and design practice.

Typically during a regular class, the student is invited to make a draft of a students' refectory in half an hour. As they had been introduced to concepts of accessibility in the previous classes they usually make their plans based on parameters that respond to the difficulties of PMD's locomotion. After that, students "try out" the physical and emotional aspects of disability in the space they have drawn. This exercise is an enriching experience because, in spite of its apparent simplicity and ease, it succeeds in awakening students' minds to the many mistakes in design that create insurmountable obstacles for people; and it allows students to consolidate questions studied in the first module.

The students wear a bandage over the eyes, as if they were blind. After some stumbles and falls, they get aware of "another" reality. Getting back to classroom they listen to some invited lecturers which describe their visual difficulties and disabilities. Then students are invited to reorganize their plans making use of high relief glue so they can discuss it with the

blind lecturers.

Based on the "surprise factor" and linking students' experiences to the teaching of architectural design, we could reach our objectives, which include: sensitizing architecture students to the architectural and environmental implications of designing for human diversity; searching for a humanistic view of the profession; supporting plans for city spaces that aim at the participation of users with mobility difficulty; and demonstrating that socio-spatial inclusion can be compatible with exemplary design.

The distribution of this didactic content during the semester follows a sequence that has a theoretical module, experience module or spatial experience, conferences module, and design module.

Theoretical module

The student is introduced to the concepts of Accessibility and Universal Design. Notions of spatial segregation and stigma are discussed and it is suggested a reflection over the importance of built spaces as agents that congregate differences.

Experience module or spatial experience

Some exercises are organized to make students experience physical, perceptive and emotional aspects of people with mobility difficulty. Students wear bandages over their eyes, use wheelchairs or canes and get surprised with the great difficulty they have in getting through or around architectural barriers they previously did not notice.

For wheelchair use, we first had discussion to extract from our students the most crowded and the favorite places on campus. Groups of two or three students select a list of tasks they usually perform in those spaces. Each group received a wheelchair, a bandage for the eyes, an ear lid, and a cane. The exercise begins with an activity such as visiting the library, or having lunch at the university dining-hall.

Afterwards, discussion of the experience revealed that each deficiency observed requires a specific architectural response. They also see the necessity of complementing one response with others, to avoid excluding other with a disability.

Figures 7.15. Samples of the workshop with students. Spatial experience module: Students move on wheelchairs, wear bandages over the eyes or over the ears. They feel different because of architectural barriers.

The experience awakens students to the psycho-social matters that inevitably follow the confrontation with the lack of accessibility. The students express feelings of frustration, shame, fear, insecurity, lack of independence and autonomy. For examples students reported feeling: powerless when unable to go to specific academic spaces; shame when asking for help when it's necessary; confusion on getting lost in open and ample spaces because of visual disability; tiredness generated by walking on ill-paved surfaces; constant fear of falling down; frustration of being on wheelchairs and not seeing objects placed on higher shelves; fear of not hearing fire alarms and sensation of exclusion when not listening to what people talk; and indignation with some reactions–attitudes of pity– and sensation of being pointed as different.

Figures 7.16a, b. The workshop in the School of Architecture and Urbanism – UFRJ.

Conferences module

We invite some lecturers, especially those with different kinds of mobility problems, to talk to students,. They make evident that spatial exclusion exists and explain their necessities in terms of architectural design, also giving personal suggestions on the accomplishment of students' plans and talk about architectural barriers that lead them to spatial segregation.

Figure 7.17. Lecturer who is blind speaks to students about the difficulties from inaccessible architecture.

Figure 7.18. Person who is blind testing the spaces in the architectural plan.

Design module

At the end of the semester the module of design is intensified in relation to the theoretical taught and experience exercises. That is the time when we ask for the development of an architectural program to be followed in individual plans. First, the students produce a short biography for imaginary clients and are stimulated to choose clients with disability. The 'budget'

Figure 7.19 a, b. Design Module – working with architecture and urban projects in the classroom.

for this exercise is considered to be unlimited. Then, they must develop an architectural program to shape the form of the project. To improve skills for this exercise, we invite people with mobility difficulties to visit the classrooms and informally chat with the students. Students should be trained from the start to see their clients as a partner in the design process.

Finally, they make a collective exhibition of projects, to spread the experiences to other students and faculty. The discipline has a multiplying power. Many students enrolled in it also elected accessible plans, rehabilitation centers and residences for older adults as their final design studios.

The teaching method has shown some encouraging results in creating, with our students, a comprehension of the architect's social function as partly responsible for the elimination of differences and for the quality of life of every citizen.

For this experience we received, in 2002, an international award given by the European Association for Architecture Teaching–the EAAE Prize Competition, an extra special honor, as we were the only non-European laureate institution. This encouraged us to continue our methods for teaching inclusive design and keep up with developments. This international acknowledgement recognized us as being on a different level of excellence compared to other research groups in Brazil. It also noted that only through hard work could we construct a qualitative teaching method in the field of accessibility and universal design.

Results and Conclusions

Our work has found that the Brazilian planning situation lacks a wider view for the implementation of accessibility and universal design. Most spaces in Brazilian cities cannot be used,

experienced and inhabited by every citizen. We have verified the many barriers still found in places where PMD develop their quotidian activities. We still have social barriers and exclusion of these people from society.

Brazil has some of the most advanced legislation and technical rules to guarantee accessibility for PMD; and some universities and schools have adopted new paradigms for the inclusion of every person in their spaces. The acceptance of our Research Group represents an important achievement.

The improvement, consolidation and outspreading of Núcleo Pro-acesso (Accessibility Research Bureau, ARB) has incited this process. Our work focuses on new perspectives that, one can transform into sources of diffusion of a new materialized culture. We aim to do it through academic activities we have been developing, practicing and seeding throughout Brazil. An important evaluations regards the evidence of the necessity of this approach in faculties of architecture all around the world. Our teaching method at UFRJ demonstrates these changes. Some students have incorporated solutions for spatial inclusion in their professional lives. In Post-grad studies it is also greater the interest for research, dissertations and doctorate thesis related to accessibility, universal design, perception and environmental experience of PMD.

We have also stimulated the accomplishment of interdisciplinary research. For example, the National Seminar Accessibilidade no Cotidiano (Accessibility in Quotidian Life) held in 2004 in Rio de Janeiro showed the state-of-art of the research in accessibility in Brazil and produced a list of goals for getting it implemented. We plan to support extensive courses for design professionals–from the second semester of 2006, on–contributing to the construction of a new vision in spatial planning. Although we still face extensive challenges in Brazil, the changes derived from our activities leads us to believe that we will continue to make progress.

We have witnessed many great scientific, technological and cultural improvements which arise–directly or indirectly–from academic inventiveness and competence, a foundation of cultural diffusion and opinion-making in Brazil. Universities should create informed citizens and qualified professionals. They should rethink their missions to respond to the needs of their time, and pursue alternatives based on equality, liberty

and fellowship.

We hope our work will be an agent of spreading information on accessible facilities for people with disabilities and to allow the whole urban population to live with human diversity in the spaces, be it a building or the city. To avoid spatial exclusion we ought to design for all according to universal design.

Once people considered it enough to install a ramp for persons who use wheelchairs, to enable them to get into a building, and enough to provide special elevators for those who use wheelchairs, or separate restrooms. Now, it is common to have a comfortable single restroom for any kind of person. Using universal design can create pleasant experiences for everyone with or without a disability in public and private places in our cities.

Research in the field can provide fundamental tools in the generation of new directions that aim at a profitable and comfortable improvement for every human being. Starting to eliminate barriers, foreseeing new facilities and finding solutions for built environment can enable us to integrate PMD into society. If these actions are neglected, public spaces will represent the crystallization of disability itself.

This research also complements a line of investigation turned to the inclusion of the theme into Architecture and Urbanism courses. The concreteness of the acts that have been developed by ARB seeks to build new minds in the planners of future cities. We hope these future architects and urban designers will work for the elimination of physical barriers as well as social, cultural, political and bureaucratic.

In this context, we believe that inclusive spaces can provide PMD with the sense of safety, workability and freedom in mobility to guide his or her actions and find a balanced relation with the outside world. We hope this chapter and the tools we created can help professionals in Brazil and in other countries in this process to create integrated places with a positive social impact in our cities.

References

Brazilian Association of Technical Standards (ABNT). (1994). NBR 9050: Accessibility of People with Mobility Difficulty to Buildings, Space and Urban Equipment. Rio de Janeiro: ABNT.

Carvalho, R. S. de. (2005). Socio- Spatial Inclusion of Children with Special Needs through Rides in Public Plazas. Master Dissertation, School of Architecture, Federal University of Rio de Janeiro.

Choay, F., & Merlin, P. (1988). Dictionnaire de L'Urbanisme et de L'Aménagement. Paris: Puf.

Cohen, R., & Duarte, C. R. (1995). Brazil: Ideas into Action for the Accessibility Rights in a Developing Country, In Proceedings of the 7th International Conference on Mobility and Transport for Elderly and Disabled People, Reading, Berkshire, United Kingdom: Jul.

Cohen, R., & Duarte, C. R. (2001). Development and Accessibility in Brazil: Universal Design at the campus of the Federal University of Rio de Janeiro, In International Journal Universal Access In The Information Society (p. 80–81).

Cohen, R., & Duarte, C. R. (2004b). Acessibilidade aos Espaços de Ensino e Pesquisa: Desenho Universal na UFRJ - Possível ou Utópico?. In: Anais do NUTAU, São Paulo. NUTAU/USP.

Cohen, R. Urbanismo e Acessibilidade. (1993). Jornal Superação, YEAR VII, N. 6, Rio de Janeiro: Out./Nov./Dez.

Cohen, R. (1999). Accessibility, Identity and Everyday Life of Persons with Mobility Difficulty: case study of the Rio-City Project. Master Dissertation on Urbanism, Federal University of Rio de Janeiro.

Cohen, R. (2006). City, Body and Disability: possible routes and speeches in urban experience. Doctorate Thesis on Psycho-sociology and Social Ecology, Federal University of Rio de Janeiro.

Cosnier, Jacques. (2001). L'éthologie des espaces publics. In M. Grosjean, et J-P. Thibaud (Eds). L´Espace Urbain en Methodes. Parenthèses, Marseille,.

Duarte, C., & Cohen, R. (2003). Methodologies d´Enseignement de l´Architecture Inclusive: Créant des Outis pour la Qualité de Vie pour Tous. In: The EAAE European Association for Architectural Education: Writings in Architectural Education, pp- 82-97.

Duarte, C., & Cohen, R. (2002). People with Mobility Difficulty and Space Experience in the Cities, In 17th Confer-

ence of the International Association for People-Environment Studies: Culture Quality of Life and Globalization - Problems and Challenges for the New Millennium, IAPS, La Coruña.

Duarte, C., & Cohen, R. (2002). Quality of Life and Inclusive Design: Teaching Experience in Brazil, In 19th International Conference PLEA Designing with the Environment, Tolouse. Proceedings of the 19th International Conference of the PLEA. Toulouse: GRECO e ACAD, v.2. pp. 697-702.

Duarte, C., & Cohen, R. (2004a). Metodologia para avaliação de acessibilidade em escolas de ensino fundamental. Relatório de Pesquisa enviado à Faperj. 80p.Núcleo Proacesso/ UFRJ. Rio de Janeiro.

Duarte, C., & Cohen, R. (2005). Pesquisa e Projeto de Espaços Públicos, Rebatimentos e Possibilidades de Inclusão da Diversidade Física no Planejamento das Cidades. In Anais do Projetar – II Seminário sobre ensino e pesquisa em projeto de arquitetura. PROARQ/FAU/UFRJ. Rio de Janeiro.

Duarte, C., & Paula, K. C. L. de. (2002). A Cegueira e suas Implicações no Desenho Urbano Sustentável: Um Estudo da Imagem da Cidade de Londrina. Abstract apresentado em formato Pôster. NUTAU, São Paulo.

Edict N. 5.296 of December 2nd. (2004). Republican Presidency/Civil State House. Retrived on may, 23rd, accessible in : <https://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2004/Decreto/D5296.htm>.

Fernandino, S. F. (2006). Acessibilidade Ambiental: das disposições legais à inclusão espacial das Pessoas com Deficiência. Master Dissertation, School of Architecture, Federal University of Rio de Janeiro.

Grosjean, M., & Thibaud, J-P. (2001). L´Espace Urbain en Methodes. Ed. Parenthèses, Marseille.

Guimarães, M. P. (1991). Behavioral Factors in Barrier-Free Design. Master Dissertation, State University of New York at Buffalo.

Guimarães, M. P. E., & Fernandino, S. F. (2001). Coletânea de Critérios para a Acessibilidade, In Projeto Escala Gradativa da Acessibilidade, fomentado pela CORDE / Ministério da Justiça. ADAPTSE EA UFMG, Abril.

Lynch, K. (1990). A Imagem da Cidade. [trad. Maria Cristina Tavares Afonso]. Lisboa: Edições 70.

Mettetal-Dulard, L. (1994). Les personnes Handicapées Physiques et la Ville des Autres. DEA en Urbanisme et Aménagement, Politiques urbaines, Aménagement et gestion de l'éspace. Institute d'Urbanisme de Paris, Université Paris XII, Val de Marne.

Paula, K. C. L. de. (2003). Architecture beyond Vision: a consideration over the experience in built environment from the perception of congenital blind people. Master Dissertation on Architecture, Federal University of Rio de Janeiro.

Preiser, W. F. E., & Ostroff, E. (Eds.). (2001). Universal Design Handbook. McGraw-Hill. Ruaviva (Ngo). Mobilidade Urbana e Sustentabilidade. Retrieved on may 10th 2004, accesible in: http://www.ruaviva.org.br.

Steinfeld, E. (1994). Arquitetura através do Desenho Universal, In: Proceedings of the VI Seminar on Accessibility to Environment (VI SIAMF), Brasília: Coordenadoria Nacional para Integração da Pessoa Portadora de Deficiência (CORDE).

Thibaud , J-P. (1996). Mouvements et Perception des Ambbiances Souterraines. Les Annales de la Recherche Urbaine. Paris. 71, juin

Tuan, Y-F. (1993). Espaço e Lugar: A Perspectiva de Experiência. São Paulo: Difel. USP. USP LEGAL. Disponível em www.cecae.usp.br/usplegal/default.htm

Universal Design Guidelines to Accommodate Wheelchair Occupants in the Thai Context

8

Antika Sawadsri

Abstract

Universal design has been adopted by many environmental design researchers. How well do the guidelines fit the distinct socio-cultural contexts. This research considered how western universal design guidelines on space, form, and function fit in with the distinct socio-cultural context of a developing country, Thailand. The present study found a distinctive issues in applying western universal design guidelines to the Thai context. This chapter suggests that implications of residential modification according to universal design concepts need to be carefully considered on distinctive socio-cultural factors, including the nature of behavior of people with disabilities and the research method in built-environment discipline.

This chapter seeks to understand if the way Thai people with disabilities live at home differs from the way people in the west do and how that may affect universal design guidelines. Environmental design for people with disabilities in Thailand has focused on solutions for physical impairment. It deals more with how to overcome the limitations of physical impairment than on how to modify the physical environment to serve people with different abilities.

Design for people with disabilities has focused on eliminating physical barriers, yielding solutions that have transformed living spaces into nursing homes. This type of solution does not answer co-residents' views on accessible homes. Dobkin and Peterson's (1999) example of the critical attitude of non-disabled family members highlights the tension, in which the daughter whose aging mother has a physical impairment asked when confronted with unpleasant home modification "'Why couldn't she try harder?' I wondered. 'Did she want me to change my home to a nursing facility?'" Thus, designs aiming to create accessible homes need to consider whether changes are acceptable to people with the disabilities and their

co-residents.

The universal design concepts studied here aims to create accessible places, especially in homes. It underpins Thai legislation on disabilities and accessibility. Implementation requires careful consideration of the distinct human size and shape, as well as the socio-cultural aspect, of people with disabilities and their co-residents. On all counts, these differ from western models.

This study explored two questions:

1) To what extent can Thailand implement the universal design concept in the distinct Thai cultural context?

2) What behavior, spatial needs, and optimal spatial size and shape should the design have to accommodate Thai people with disabilities?

Why the Universal Design Concept?

"Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (Mace, 1999).

This idea gives the impetus to this study, focusing on the new paradigm that questions the importance of built environment itself as the crucial factor that supports or impedes users (Steinfield and Danford, 1999). Previously, design for barrier-free environments and accessible places for people with disabilities concentrated on legal, economic, and social forces, mostly based on the needs of the person with a disability. Design advocates sought to renovate buildings by providing accessible features, such as providing at least one toilet with wider space, grab bars on all sides, and special features to assist an older adult or person with a disability in each restroom. However, these alternative and new fittings may have overlooked aesthetics and not fit into the building. Fears of market declines associated with such modifications have led to the avoidance of installing too much assistive technology. Instead, the market has turned to design that focuses on meeting the needs of a broader range of abilities where less special technology or modification is needed.

Universal design is not a design style, but an orientation to any design process that starts with a responsibility to the experience of the users.

Universal design emphasizes accessibility and seeks to accommodate a wide range of people. Unlike in the West, in the Thai socio-cultural context people commonly live in the extended rather than nuclear family. A Thai family may have family members from a grandmother to a new born baby, with a range of sizes, shapes, and abilities. To what extent do Universal design guidelines meet the needs of the full family?

Method

This study had three stages, each using different methods:

1) A Post-Occupancy Evaluation (POE) of the fit of the environment with the behavior of people with disabilities;

2) An experiment to evaluate the optimal spatial size and shape of people with disabilities; and

3) Structured, closed-end questionnaires to determine the level of satisfaction among co-residents for housing modification in accordance with existing universal design guidelines.

The POE assessed the area and user satisfaction to identify the need for spatial modification. It focused on the characteristics of space that affected the living behaviors of persons with a disability. It used in-depth interviews, open-ended questions, and photographs of existing conditions to uncover problems, difficulties, barriers, and spatial needs encountered by the subjects in their daily domestic lives. The analysis showed the type of spatial behavior that affects the spatial sizes and needs.

The experiment on optimal spatial size and shape adopted Lantrip's (1999) Body Motion Envelope (BME) to measure movements in living areas of people with a disability. It used anthropometric measurements and biomechanical methods to assess the needed spatial size for a human body performing tasks. It examined different human body sizes and shapes to ameliorate the fit between the human body and space in the built environment. For example, body size impacts the width of entrance doors as well as the height of counter tops. Biomechanical measurement determines the power-use level needed to control equipment, such as the range of reach needed to open a door, the level of energy used while accessing a ramp by wheelchair, and so on (Steinfield, 1999).

Following the work of Sanford and Megrew (1999), this research created mock-up environments to investigate the actual spatial needs of people with disabilities. One must measure

both objective and subjective points of view. This meant that experiments with mock-up spaces involved video recording the movements of people doing tasks from above, observing constraints, and using questionnaires to find their perceptions of safety and difficulty while performing tasks. The questionnaire, adapted from Lantrip's (1999) Enviro-FIM (Environment Functional Independence Measurement) used a five-point Likert scales to define the users' comfort levels (i.e., from very easy to very difficult). This stage also obtained measures of the area that people with disabilities occupied and needed to perform their activities. The BME method assessed characteristics from the video recording and traced the area around human bodies when moving while they did activities such as shifting from wheelchair to furniture, washing hands in a basin, and moving objects between two opposite sides of furniture. The BME encompasses an area that provides enough space to finish an activity. Figure 8.1 shows an example of the BME measurement. It shows the envelope drawn around the occupied space of each person with a disability's body while performing a given task.

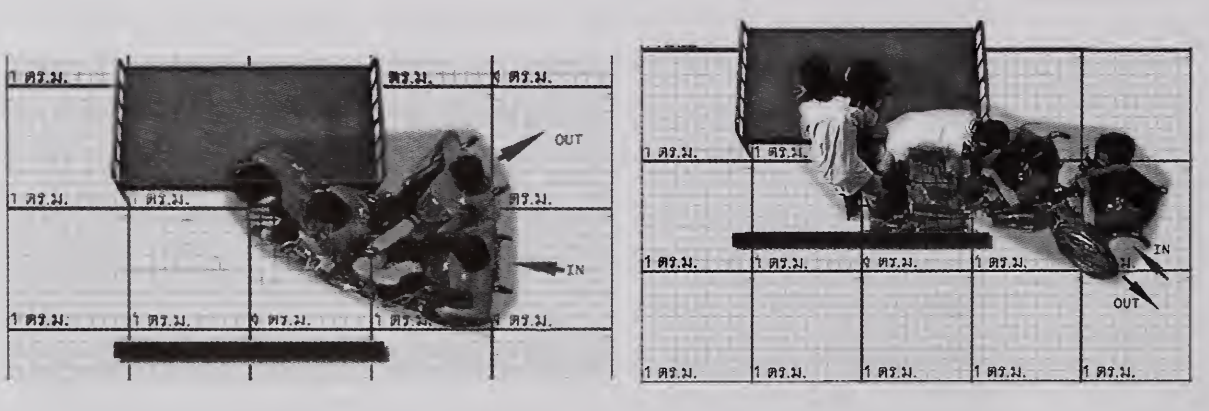


Figure 8.1. The contour of envelope around the space in the BME experiment, a volunteer shifting himself from his wheelchair to a bed (Source: Experiment, December, 2002).

A final stage used quantitative measures. Questionnaires explored in depth the attitude toward home modification of co-residents who live with people with disabilities. The questions used semantic differential scales, with choices referring to the satisfactory level of acceptance of the proposed home modification guidelines derived from the experiment. Figure 8.2 shows the sequence of the BME method. Figures 8.2 (top

right and bottom left) show the optimal space required by a person who uses a wheelchair, and Figures 8.2 (bottom left and bottom right) show the optimal kitchen space proposed to co-residents to ask for their acceptance of home modification. Respondents indicated their acceptance of the modification.

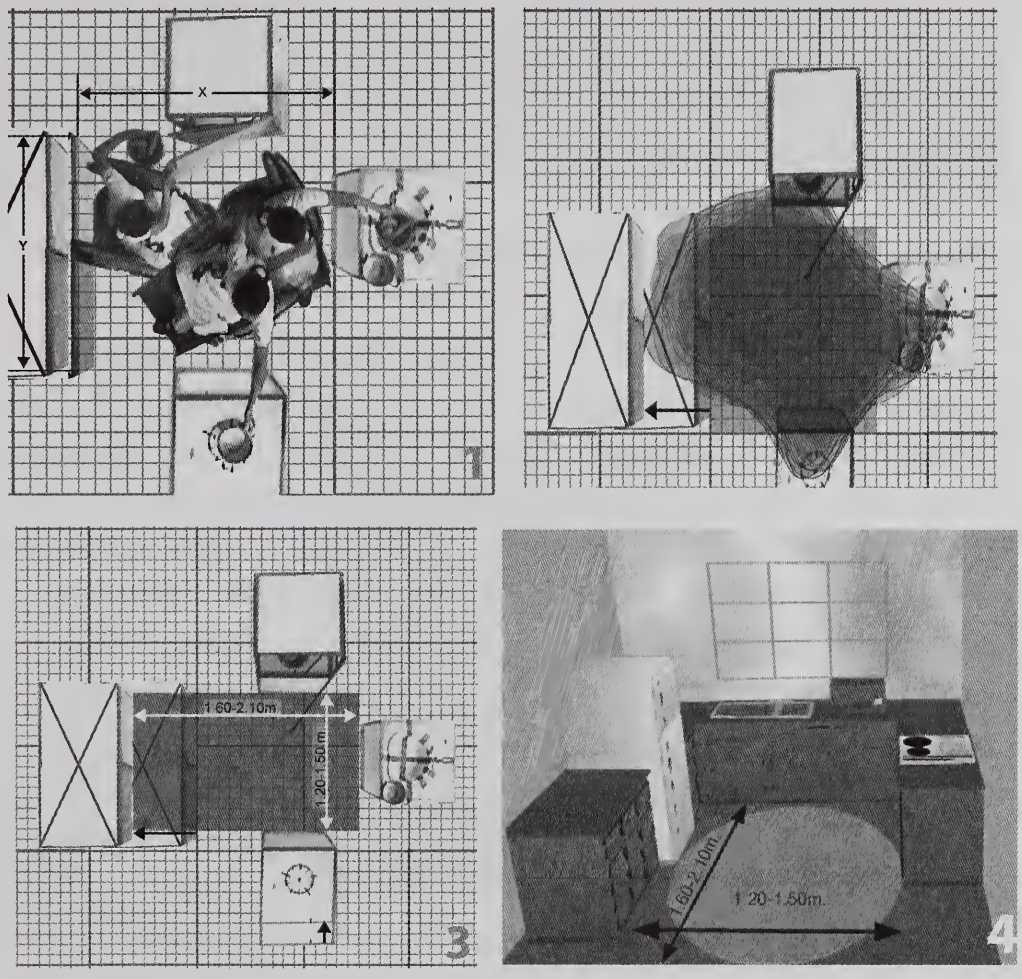


Figure 8.2. Four-stage sequence of the BME method (Source: experiment, December, 2002).

Participants

This study selected people with disabilities who have mobility impairments and use wheelchairs to live their daily lives. They make up forty-seven percent of the population with disabilities in Thailand (National Statistics Office, 2001, Report of Disabled Persons Survey, Thailand). Thirty-one households in Bangkok and surrounding areas took part in both the field survey and the opened-end questionnaires.

A second group included wheelchair users who were willing to volunteer for an experiment investigating the optimal

spatial characteristics in residential areas. This experiment had three groups of activities: circulating wheelchairs around living spaces, shifting from wheelchairs to other pieces of furniture, and doing daily activities while sitting in wheelchairs. The investigator studied the optimal sizes and shapes for fifteen different tasks found in existing households in the field survey.

To analyze attitudes toward the acceptance of housing modifications, a final sample group involved co-residents living with wheelchair users. The investigator distributed closed-end questionnaires to 563 people. 44.8 percent responded.

Environmental-behavior of Thai People with Disabilities in Domestic Spaces

The field observation (n = 31) found that 54.8 percent of the people with disabilities lived in extended families and 61.0 percent lived in detached houses, with 84 percent of these households having arranged sleeping areas on the ground floor for the disabled member. The POE revealed that residents had modified significant areas, particularly for ramps at entrances, and widening interior circulation routes. The field survey found that most households faced financial problems and problems due to limitations of existing home plans. Furthermore, contractors (not architects) designed and built 90 percent of the houses in the study. This suggests that homeowners need special knowledge. These issues, therefore, have resulted in struggles for home modification. Figure 8.3 shows a practical solution in the existing conditions, an easy-made ramp at the entrance door (left) and a widened interior circulation route (right) for a wheelchair user.

90 percent of the thirty-one households said that they preferred to adapt the available features or furniture in their homes to assist them in completing daily activities, for example, relocating a metal chair (Figure 8.4) from the garden to the bathroom because it works well in a wet area and is more stable than a plastic chair.

Non-structured interviews revealed that residents, and in particular wheelchair users, preferred to adapt their existing furniture and use assistive equipment rather than paying for a specially designed piece of furniture which may cost more. New features designed specifically for persons with disabil-

Figure 8.3. Existing home modification of residential areas of wheelchair users (left: ramp; right: widened circulation) (Source: Field survey, September 2002).

Figure 8.4. A shower chair, reused from the garden chair (Source: Feld survey, September 2002).

ities seemed like a stigma to them. Furthermore, they wished to maintain the traditional appearance of their homes.

The characteristics of spatial size and shape, affected by spatial behavior, emerged in three different sets: the interior route the wheelchair users followed around their living spaces, the space required by wheelchair users to shift from their wheelchairs to furniture, and the clearance spaces around furniture needed to perform daily activities in wheelchairs.

Type of Spatial Behavior	Physical Barriers	Factors that Impact Home Modification
Circulating wheelchair	- Steps over two centimetres	- Limitations of housing configurations
- Direct route	- Width of interior routes less than 80 centimetres	- Financial difficulties
- Turning point areas	- Limited space at corners around furniture	- Degree and time of impairments
- Clearance for turning back	- Steepness of ramps/slopes	- Skill in using wheelchairs
- Approach to furniture		
Shifting from wheelchair to furniture (e.g., to bathing chair, bed, toilet, or car (in a garage)	- Clearance around furniture	- Limitations of housing configurations
	- Height differences between wheelchairs and furniture (e.g., wheelchair and seating, wheelchair and mattress)	- Financial difficulties
		- Degree and time of impairments
		- Skill in using wheelchairs
Doing activities while sitting in wheelchair	- Clearance and height of furniture tops	- Reaching ranges of wheelchair users
- Moving objects on tables	- Distance between pieces of furniture	- Financial difficulties
- Using wash basins, sinks, or stoves	- Width of cabinet doors	- Types and configurations of the houses that affect interior furniture layout
- Opening cabinet doors		
- Transferring objects between pieces of furniture		

Table 8.1. The physical barriers and factors of home modification according to the spatial behaviors found in the study

When asked what characteristic of behavior would most affect the spatial configuration and spatial needs in residential areas, respondents mentioned three sets of items: 1) activities about shifting the person with a disability from wheelchair to

furniture, such as a toilet, bathing chair, bed, or car; 2) characteristics of the circulation route connecting each area, such as width, clearance around a door, turning point, and, most importantly, steepness of ramp and slope; and 3) spatial behavior with regard to daily activities while sitting in a wheelchair, such as moving an object between two positions of furniture and reaching range while doing an activity on top of a table, on cabinets in a kitchen, sink, and wash basin. Table 8.1 shows the detail of each characteristic, describes the relationship between the behavior of wheelchair users, and the physical barriers in residential areas, all of which affect home modification from the factors that were uncovered in this study.

The in-depth interviews also revealed the importance of considering less typical factors that affect the necessity of home modification. These include the level and time of impairment, an individual's skill in using a wheelchair, the physical barriers that resulted from housing configuration (i.e., the house layout that affects the arrangement of the furniture), the income rate of each household, the status of the wheelchair user in the family, and the need of housing adaptation of the person with a disability him or herself.

Although the issue of the status of the wheelchair user was unexpected, it revealed that in cases in which the wheelchair user owned the house, the house experienced considerable modification. For example, in thirteen of the thirty-one households the homeowner had the disability. These residents renovated and modified their homes in many areas (e.g., ramps at main entrances, lifts, no steps in interior routes, and adapted heights of furniture, such as the level of toilets (Figure 8.5).

The example of the status of a wheelchair user discussed above was one of several hidden dimensions. The solution of accessibility, therefore, cannot solely consider the physical aspect. In addition, an individual needs play a significant factor in the extent of residential modification.

Discussion

This investigation found a distinctive result that differs from western universal design guidelines. The closed-end questions about factors affecting home modification decisions showed that many respondents consider housing modification that

Figure 8.5. Existing housing adaptation where the wheelchair users are homeowners (Source: Field survey, September 2002).

should meet the need of a family member with a disability even if it may lessen the aesthetic of their house. Few expressed concern about aesthetic aspect. This contrasts with the western view, in which the appearances of residential spaces and their accessibility is important, as well as the need to ameliorate and fit the environment (Mace, 1999) or to do it invisibly.

This study also found that the human sizes and shapes of wheelchair users differ from those suggested by the western universal design guidelines. For example, an experiment testing the steepness of ramps found that wheelchair users in Thailand prefer the ramp at 1:8 rather than the recommended 1:12 because 1:8 is shorter and requires less energy.

The data also revealed that the reported intimacy between a co-resident without a disability with a wheelchair user and a wheelchair user oneself had an affect on the level of acceptance of housing modification. For example, a co-resident who married to a person with a disability felt that a modification was more necessary than did a cousin. The restriction of home plans also affected the approval of home modifications. Co-residents who lived in the detached houses accepted ramp modifications, whereas co-residents who lived in townhouses found it is more difficult to do so.

Conclusion

In the Thai context, people without disabilities who are involved with disability view the need of people with disabilities as important as the expense of housing modification. This differs from the western context, which considers that the built environment should serve all people while also considering aesthetics.

The findings also suggest that design must consider hidden socio-cultural dimensions. For example, many people did not modify their areas because they expected to recover and they wanted to keep their houses looking "normal." Additionally, some residents viewed their homes as a heritage to pass to a future generation, so they did not want to change them.

The findings also suggest the importance of the extended family in the Thai context. Unlike the nuclear family pattern in the West, in Thailand people with disabilities do not live independently, but with their extended family.

The application of residential modification according to western universal design concepts needs careful consideration for the distinctive nature of people with disabilities in terms of social psychology, familial background, the extent of disabilities, and the specific needs required by each of the individual residents. Further work should consider a broader group of people with disabilities. We need considerably more research to determine the universal design guidelines as they relate to different socio-cultural conditions.

References

Dobkin, I. L., & Peterson, M. J. (1999) *Gracious Space: Universal Interiors by Design*. New York: McGraw-Hill.

Lantrip, B. (1999). Measuring Constraints to Inhabitant Activities. In E. Steinfeld, & S. Danfortd (Eds.), *Enabling Environments: Measuring the Impact of Everyday Environment on. Disability and Rehabilitation* (pp. 139-164). Berlin, Germany: Springer

Mace, R. L. (1990). Definition of Accessible, Adaptable and Universal design, [Online] Available: http://www.design.ncsu.edu.

Mace, R. L. (1999). Universal design in Housing, [Online] Available: http: //www.adaptenv.org/universal.

National Statistics Office (2001) Report of Disabled Persons

Survey of Thailand [Online] Available: http://www.apcd-project.org/Countryprofile/thailand/thailand_stat.html

Steinfeld, E. (1994). The Concept of Universal design. New York. Center for Inclusive Design & Environmental Access State University of New York at Buffalo.

Steinfeld, E., & Danford, S. (Eds.). (1999). *Enabling Environments: Measuring the Impact of Everyday Environment on. Disability and Rehabilitation.* Berlin, Germany: Springer

United Nation and United Nations Centre for Human Settlements (Habitat). (1981). Designing with Care, Sweden. Swedish International Development Authority (SIDA).

Universal Design in the Institutional Setting: Weaving a Philosophy into Campus Planning

9

L. Scott Lissner

Introduction

An effective campus master plan serves an institution's strategic and academic plans, mapping them onto the campus so that the environment supports and expresses the university's mission (Abramson & Burnap, 2006; Walleri, Becker & Lynn, 2002). The importance of effective planning and the processes that support it increase during periods of rapid growth. In 2002, construction on U.S. college and university campuses reached a 31-year high, and current industry analysis predicts even higher levels by 2009, when new construction should peak at 34.5 million sq. ft. (Kennedy & Boothroyd, 2006). Levels of construction at The Ohio State University (OSU) reflect the national building boom. Since being hired in January 2000 as the university's Americans with Disabilities Act Coordinator, this chapter's author has actively participated in the planning and design process.

This chapter explores how one can use the philosophy and principles of universal design as a basis for developing an institutional approach that bridges academic, strategic, and campus planning. Highlighting the holistic nature of effective planning and design, the chapter identifies malleable variables, key points in the process where change is possible, effective, and likely to influence policies by shifting the institutional planning philosophy. After setting the context, the chapter describes specific elements and activities to use to encourage universal design over code compliance approaches at both a building and campus scale in other institutional settings.

Historical Context

Like many universities in the United States, OSU established an Office for Disability Services (ODS) (http://www.ods.ohio-state.edu/)* during the mid-seventies to implement Section

504 of the Rehabilitation Act of 1973. By 1990, after the ADA had passed, the number of students with disabilities expanded and the university anticipated a wider participation by individuals with disabilities in employment and other university activities. As had occurred elsewhere, ODS became an office focused exclusively on student access issues (Lissner, 2005).

OSU allocated compliance responsibility within nine major administrative areas of the university (Facilities & Planning, Student Affairs, Human Resources, Medical Center, and the regional campuses). For each area, OSU assigned an employee to take on this responsibility in addition to their existing duties. This left ODS as the only unit charged exclusively with focusing on disability and access, but it narrowed its mission and made the scope of its authority to student access unclear. This compartmentalized approach to disability policy resulted in unclear lines of authority and inconsistent approaches to access. By the late 1990s, students and faculty brought attention to the lack of coordination arising from the decentralized approach. In January of 2000, the university hired its first full time Americans with Disabilities Act (ADA) Coordinator, who reports to the Provost and develops and coordinates policy and compliance for disability across the spectrum of the university's activities and facilities (http://ada.osu.edu).

As disability policies have evolved, other changes set the stage. From 1993 to 1995, OSU developed a comprehensive Master Plan (http://fod.osu.edu/pare/index.htm). Between 1998 and 2000, it developed an Academic Plan (http://www.osu.edu/academicplan/preface.php). These plans provided direction for the emerging campus construction boom that peaked in 2005. As the first full time ADA Coordinator for the university, the author has been a participatory observer in an extensive building program, a process development, and the updating of the university's academic and master plans.

Campus Context

OSU, a public research institution with the highest single campus enrollments in the nation, has a large and diverse population, and a large and varied infrastructure. Currently, it enrolls 59,091 students overall (51,816 in Columbus) and employs 38,198 individuals in 928 buildings on 15,655 acres at locations around Ohio (http://www.osu.edu/information.php).

Location	Acreage	Buildings
Columbus Campus	1,755	471
Lima,Mansfield, Marion, & Newark Campuses	1,499	44
Ohio Agriculture Research & Development Center & the Agricultural Technical Institute	7,965	341
Molly Caren Agricultural Center	2,095	19
Don Scott Airport	1,404	10
Golf Courses	295	4
Miscellaneous	644	39
TOTAL	15,655	928

Table 9.1. Overview of OSU's Campus

In addition to academic buildings, research labs, agricultural facilities, and residence halls, OSU houses a major research medical center, restaurants, an airport, a power plant, a hotel, museums, and athletic and entertainment venues (Table 9.1).

Given the size and age of its infrastructure (the average building age is 30 years, with 123 buildings over 50 years old), for the past 10 years OSU has had roughly 50 construction projects with budgets over $200,000 in progress at any time. Half of them have had budgets over one million dollars.

The typical college with a smaller campus and slower pace of construction can still learn from our experience. The rapid pace of construction provided opportunities for repeated observations across the life span of many large scale projects within one institutional context—opportunities to see the immediate impact of process changes on a current project and, if the impact is sustained, across projects. In short, the pace and volume of construction create the planning equivalent of the geneticist's fruit fly.

Before highlighting the process and exploring the malleable variables that shift campus culture, take a moment to review the principles and philosophy of universal design as I use them. For those interested in a broad and in-depth discussion, I recommend two sources as starting points. *The Universal Design Handbook* edited by Wolfgang F. E. Preiser and Elaine Ostroff (2001) provides a comprehensive picture of universal

design's applications in architectural, industrial, and environmental design. The Autumn 2006 special issue of the *Journal of Postsecondary Education and Disability* (19, 2) explores the application of universal design to the design of instruction and evaluation in higher education.

Louise Jones (2004) discusses the breadth of academic users and connects the need to be inclusive (i.e. universal design) to environmentally responsible design, saying that "Environmentally responsible design addresses the interrelationships of human needs/behavior, design, and environmental responsibility. Designers, who practice environmentally responsible design, plan, specify, and execute interior environments that reflect their concern for the users' quality of life and the world's ecology" (Paragraph 4). This captures my sense of universal design. As a philosophy, it embraces diversity and inclusion, efficiency and sustainability, adaptability and usability, and it promotes equity.

Table 9.2 summarizes my view of the seven principles of universal design (discussed in Chapter 1). It lists each principle, gives a general definition, and lists two or three exemplars for each principle. This table borrows liberally from Molly Follette Story's (2001) Principles of Universal Design and Joan McGuire and Sally Scott's (2006) Universal Design for Instruction: Extending the Universal Design Paradigm to College Instruction. If successful, the table bridges the applications of universal design to and within the classroom, so that when it is combined with the underlying philosophy it becomes a tool for shifting institution toward universal design.

Equitable Use: Welcoming to diverse groups; provides for equivalent if not identical participation and effort. Consider characteristics such as height, weight, strength, vision, hearing, gender and cultural/background, experiences of all potential users. *Exemplars*: entrances at grade, captioned media, accessible web design for voice output.

Flexibility in Use: Adaptability of the overall spaces over time (sustainability) as well as flexibility and control by the users in interacting with specific elements and functions. *Exemplars:* typical gendered group restrooms vs. individual/family restrooms, alternative methods of demonstrating learning, cascading style sheets in web design.

Simple and Intuitive Use: Welcoming to non-native English speakers and individuals from diverse backgrounds; provides consistent forms, locations, and cues for way finding, operation, or interaction. *Exemplars:* building or directional signage that includes local area maps or floor plans, course management system instructions that consider the range of experience with the technology by participating students and faculty.

Perceptible Information: Communicate information effectively across the spectrum of ambient conditions (light, sound, activity) using a variety of modalities (tactile, visual, auditory, linguistic). *Exemplars:* light strobe and auditory output on alarms, pictograms on signage,volume, spacing, and size of text on PowerPoint slides.

Tolerance for Error: Minimize hazards and the adverse consequences of unintended actions, variations in pace, or vigilance; provide warnings or fail safe features. *Exemplars:* changes in texture and color at elevation changes, the "undo" option in computer software, opportunities for feedback prior to grading.

Low Physical Effort: Efficient building systems; minimize user fatigue by reducing the need for sustained physical effort, allowing for neutral or ergonomic body positioning and reasonable operating forces. *Exemplars:* Sustainable and Green building technologies, walking distances from transportation points, maintaining low slopes on ramps and paths of travel, articulating keyboard trays in computer labs, seating options in classrooms.

Size and Space for Approach and Use: Appropriate space for approach and reach across user heights, sizes, and relative position; appropriately sized elements to allow manipulation across a range of hand sizes and reach ranges. *Exemplars*: mounting heights that are comfortable for children, adults, or wheelchair riders, adequate space at computer workstations (aisles, table surface, knee clearance), adequate space to respond to test questions.

Table 9.2. Communicating the Seven Principles of Universal Design for Built and Learning Environments

Process

OSU has a formalized process to balance competing demands. This chapter can offer only an overview of each process (outlined in Table 9.3 from Campus Maps to Construction Project Process Manual). OSU's Facilities, Operations, and Development web site (http://fod.osu.edu/) has up-to-date details.

Campus Maps
http://fod.osu.edu/maps.htm
Planning and Real Estate
http://fod.osu.edu/pare/index.htm
Council on the Physical Environment
http://senate.osu.edu/Committees/COPE/COPE.html
Space Facilities Committee
http://oaa.osu.edu/sfc/
Design Review Board
http://www.fpd.ohio-state.edu/assets/pdpm/DRBProcess.pdf
Master Plan
http://www.fpd.ohio-state.edu/assets/Master_Planning/columbus/menu/
Master Plan Update
http://fod.osu.edu/master_plan_columbus/MP_update_12_aug_03.pdf
Capital Plan Process
http://fod.osu.edu/pare/docs/capital_plan_process.pdf
Design and Construction
http://fod.osu.edu/dc/index.htm
Program of Requirements
http://fod.osu.edu/dc/docs/porguide.dot
Building Design Standards
http://fod.osu.edu/dc/Building_Design_Standards.htm
Construction Project Process Manual
http://fod.osu.edu/proposals/OSU-PDPmanual.pdf

Table 9.3. OSU's Campus Planning Process

Two of the six subunits of the university's Facilities, Operations, and Development (FOD) have particular interest here. Planning and Real Estate supports the master and capital planning efforts. The Design and Construction unit implements the plan, coordinating construction and renovation projects from design through closeout. These units get guidance and recommendations from the administration and committees.

Planning and Real Estate receives input from two committees. The Council on the Physical Environment advises both the University Senate and FOD. Consisting of faculty, students, and staff, it is charged with taking a broad and encompassing

perspective on the physical environment of the university as it affects the academic enterprise and quality of life for the university community. It also proposes policies and reviews and recommends actions regarding proposed major projects. The Provost's office charges the Space Facilities Committee with reviewing space and capital funds requests in the context of the university's academic plan and making recommendations for space and budget allocations. Its representatives are drawn from Academic Affairs, Student Affairs, Business Affairs, the Medical Center, and Facilities and Development.

As individual projects move into development, a project team from Design and Construction works with the end users to develop a plan and balance their needs and desires with the goals of the wider university community. The project team and end users receive input from a variety of sources that can be divided into four distinct groups that are organized according to function and expertise: the User Group, the Consultant Group, the Technical Group, and the Support Group. Each group provides input, guidance, and professional expertise throughout the design, construction, and closeout phases of each project. Figure 9.1 shows the flow of communications between these groups.

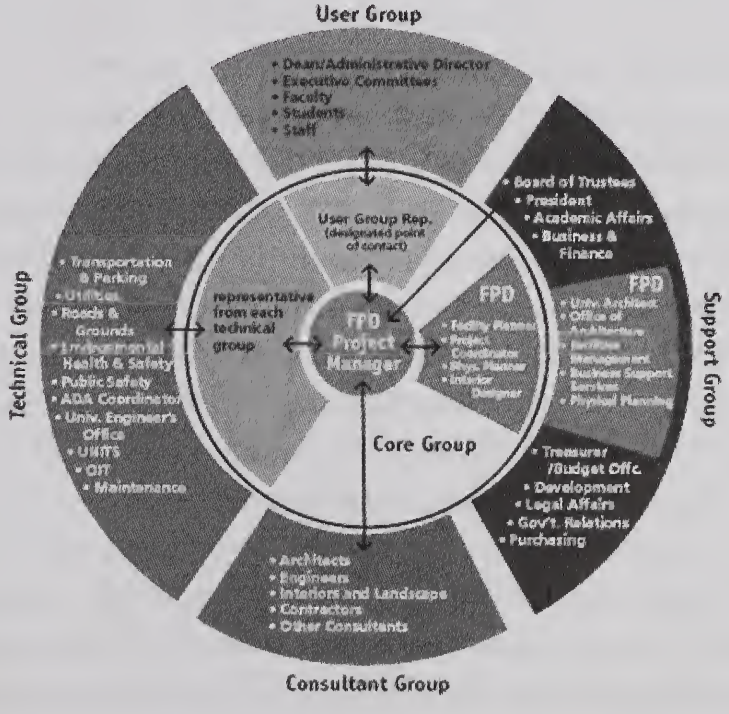


Figure 9.1. Groups and Communication Flow at OSU for Construction Projects (FPD refers to Physical Operations and Development)

A communication starts with the development of a Program of Requirements, which provides a narrative of the needs and expectations for a space. The Master Plan and Building Design Standards guide the translation of this into design.

The Design Review Board advises, reviewing projects from the perspective of the university-wide context rather than in terms of program and user needs. Using the Master Plan, policies, and design guidelines, it determines compliance with the intent of the policies, principles, and guidelines; and it recommends exceptions or modifications to the proposed projects when appropriate. The Design Review Board functions as an independent forum to provide insight, constructive criticism, and recommendations to the project's design professionals. At the close of a project, the users move into the space and the maintenance and operating units of FOD support the building through its life cycle.

Malleable variables in this process that should transfer to other contexts involve people, paper, and presence.

Once a design is committed to paper, people are committed, and they will treat changes made with a pencil as comparable to changes made with a bulldozer. While indirect, the optimal point of influence is at the most abstract stages. On the planning or campus scale, this means influencing the committees or individuals that inform and direct the planning process: "people." On a building or project scale, it means influencing the design guidelines and program narrative: "paper." Finally, one needs to create critical mass among informed participants at each stage in the process that will serve as a presence that will remind people of the principles approach until they become part of the fabric of institutional thinking.

Effective change can come from the top and bottom of the process. From the bottom, one can broaden the principles of universal design to incorporate teaching, learning, and service delivery by emphasizing the core philosophy as well as the seven principles. This approach represents an effective way to reach the people or committees at the top of the process. It also provides an easy connection to academic plans and diversity initiatives, and to sustainability and resource management.

One effective approach at OSU has involved teaming up with our offices for disability services, faculty development, and instructional technology to promote universal design in

instruction. This has provided an opportunity to promote the concepts of universal design to Deans and Chairs (key representatives and drivers of current and future design projects), including a discussion of its origins in architecture.

At the bottom of the process, I have mirrored the history of universal design, starting first at the level of blueprint reviews and compliance with the Americans with Disabilities Act Standards for Accessible Design and moving towards a more universal design approach. The documents supporting the process offer evidence of this preserved at different stages. "The university requires stringent adherence to ADA guidelines" appears in a standard for fixed furniture and equipment, and "Incorporate integrated access and usability for individuals with disabilities into initial design considerations" appears as guidance in our building design standards.

The conclusion of this approach was the adoption of a statement created in a City and Regional Planning Policy Studio in Spring, 2006. After reviewing the university's master plan and its supporting policies, the studio created the following statement that incorporates existing statement and blends them with universal design principles:

"The intent of design at The Ohio State University is to enhance the campus environment by creating sustainable structures that engage a diverse range of users by encouraging a variety of interactions; enhancing learning and research; and inviting reflection.

OSU views each building project as an opportunity to meet the unique needs of the project and advance the university's Master Plan by demonstrating its commitment to a campus culture of inclusion necessary for a rich learning environment that is essential in preparing students to work, live, and contribute in our increasingly complex society. This commitment should be reflected in design that values flexibility and sustainability that enhances the quality of work, learning, and cultural and recreational opportunities across the full spectrum of the university community. This design philosophy is the physical manifestation of the university's commitment to academic excellence, environmental and fiscal stewardship, and equity."

Presence is the third variable. The long range goal calls for the "presence" of universal design in the institutional culture; and the first step is being physically present. Early on the uni-

versity established the ADA Coordinator's Office as part of the technical group participating in blueprint reviews. It was easy to make the point that many of the comments on universal design might be addressed up front with a role in establishing the Program of Requirements. From there, the university added a support role in the Design Review Board and the Feasibility Studies. These two have particular importance because they provided early input and high visibility.

Two particular strategies have proven effective in shifting the planning culture: classes and conferences. Each year I work with one to three classes from a variety of disciplines (architecture, law, allied health, gerontology, and disability studies) to conduct accessibility audits of campus buildings. While this focuses on existing buildings, we can often target those being evaluated for renovation or replacement. This provides input and interaction, with the evaluation team raising student awareness. Additionally, we incorporate a mock mediation session during which the student audit teams propose fixes to a representative of the department that occupies the building and a representative from FOD. While the Chair does not always participate, the request initially goes to the Department Chair or Director. In a potent but non-threatening context, this approach educates this critical constituency.

We have also organized conferences on campus that are either sponsored by the ADA Coordinator's Office or held in collaboration with departments such as the College of Law, City and Regional Planning, and Occupational Therapy. Several of these have focused on design and the built environment, bringing in outside speakers and inviting the campus and off-campus community. Inviting, encouraging, and, in some cases, coercing members of the institutional design teams to participate has worked in two ways. First, exposure to the content from compliance to universal design has raised awareness and understanding. More importantly, the conferences provide an opportunity for the university to interact on the subject with many individuals who both benefit from, and also depend on these design principles to function in the environment.

What do these sample strategies have in common? Broadening the principles of universal design to include instruction made the concepts perceptible and intuitive for the intended audience and, because it was integrated into instructional de-

velopment, it required a lower effort to acquire. Working with courses to have students conduct accessibility audits and conferences with the same principles, and because of the role-play element it provided a safe learning environment (tolerance for error).

While the resources match the size of an institution like The Ohio State University, others can use the principles of universal design to develop comparable strategies elsewhere.

References

Abramson, P., & Burnap, E. (2006). *Space Planning Guidelines for Institutions of Higher Education.* Scottsdale, AZ: The Council of Educational Facility Planners, International

Jones, L. (2004). An Exemplar for Academic Buildings in the 21st Century: A Model of Universal and Green/Sustainable Design. In J. Sandhu (Ed.), Designing for the 21st Century III: Proceedings from An International Conference on Universal Design. Retrieved December 6, 2006, from http://www.designfor21st.org/proceedings/proceedings/project_jones_louise.html

Kennedy, K., & Boothroyd, T. (2006). Education Construction Gains Momentum. In *The Outlook for Education Buildings.* NY, NY: McGraw-Hill Construction.

Lissner, L.S. (2005). Education, college and university. In G. L. Albrecht (Ed.) *Encyclopedia of Disability, Volume II* (pp. 554- 556). Newbury Park, CA: Sage Publications.

McGuire, J. M., & Scott, S. S. (2006). Universal Design for Instruction: Extending the Universal Design Paradigm to College Instruction. *Journal of Postsecondary Education and Disability, 19, 2,* 124-135.

Preiser, W. F. E., & Ostroff, E. (Eds.). (2001). *Universal Design Handbook.* NY, NY: McGraw-Hill.

Story, M. F. (2001) Principles of Universal Design. In W. F. E. Preiser, & E. Ostroff (Eds.), *Universal Design Handbook.* NY, NY: McGraw-Hill.

Walleri, R. D., Becker, W. E., & Lynn, C. (2002). From Academic Vision to Physical Manifestation. Sydney, Australia: University and Institute Planners. (Retrieved Dec. 6, 2006 from http://www.eric.ed.gov/ERICDocs/)

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UNIVERSAL DESIGN AND VISITABILITY

From Accessability To Zoning

"I applaud the initiative and vision of Jack L. Nasar and Jennifer Evans-Cowley . . . With the range of authors and topics (including housing, transportation, urban form, land uses), this book is great step towards expanding planning practice to include universal design issues." — Dick Duncan, Director of Universal Design Training, Universal Design Research and Engagement, North Carolina State University

We may overlook the need for barrier-free design, until we experience an injury, or have to negotiate an environment with a stroller, or with someone who uses a wheel-chair or has vision loss. Millions of people experience barriers to movement every day. The growing aging population has made it more important that places are designed to work for all abilities and across the lifespan. Universal design goes beyond minimum access codes and standards, to design environments that are comfortably usable by people from childhood into their oldest years. It can improve livability for everyone. We hope this book advances your interest and understanding of this exciting and ever-widening movement.

Citizens, planners, members of chambers of commerce, students and professionals in the fields of environmental design and planning will find this book a valuable guide for thinking beyond basic access to make our communities more inclusive and agreeable for everyone.

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